

Texas Instruments DA710 DSP based OEM Audio Module

DAE - 77™ Floating Point dual DSP module with software for HD audio AVR applications

Momentum Data Systems DAE-77 module provide a high performance off-the-shelf audio processing solution for OEMs and system integrators needing a low cost, quick time to market solution for AV Receivers needing HD audio decoders.

The board's dual processor architecture dedicates one DSP for decode (needed for the HD audio formats) and leaves the second free for post processing. This allows for extensive post processing (such as high accuracy room EQ) that can not be achieved in single processor systems.

MDS has also included ASRC (Asynchronous Sample Rate Converters) between the two DSPs. These serve two functions in the DAE-77 system. With Blu Ray 7.1 192 kHz content becomes possible vs. the 48 kHz content normally found on DVDs. However the more sophisticated post processing (such as room EQ) expected in today's systems would present a very high processing load at 192 kHz, leading to the need to place lower performance limits on the post processing. By using hardware ASRCs to lower the sample rate, performance can be optimized across a wide range of conditions to trade off sample rate and post processing capability.

The second important feature of the ASRCs is jitter reduction. Many digital sources, and particularly HDMI, can have excessive jitter when used as the clock source for the DACs used in high performance audio systems. Typically this high jitter will manifest itself as distortion or an increased noise

floor. By using ASRCs the output DACs are totally isolated from any input jitter.



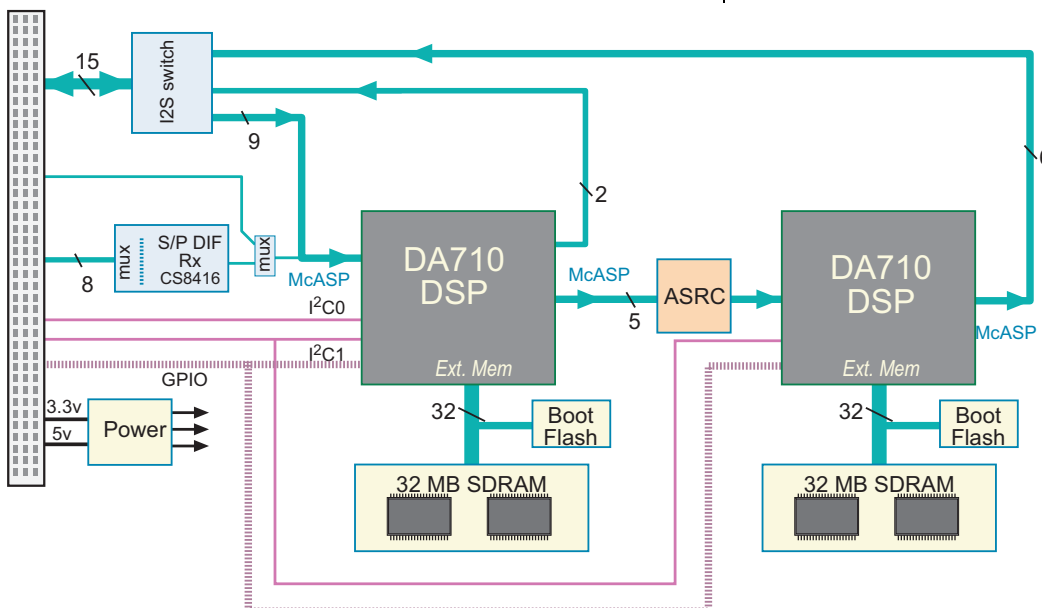
The DAE-77 can be used with MDS' HSR HDMI repeaters to create a complete AV Receiver decoding solution for the HD Dolby and DTS formats found on Blu Ray content.

For systems where an integrated analog capability is needed, please see MDS' DAE-6D datasheet.

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.

Features

- Fifteen I²S ports supporting stereo 24 bit 192 kHz data.
- Independent input and output clocks.
- S/PDIF input.
- Dual 300 MHz processor with native 32 bit floating point and extended 64 bit floating point support.
- 10 channels of ASRC for complex system needs
- 32 MB SDRAM and 4MB boot flash per processor for code.
- Low cost 120 pin 2mm grid connector (can be configured to look like MDS DAE-7A single DSP model)
- I²C control port with messaging system compatible with other DAE modules
- Flash (firmware) field upgrades via I²C from the host system processor



DAE-77 : Dual DSP Digital Audio module

The DAE-77 uses dual 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-77 Performance Audio Framework Software Features

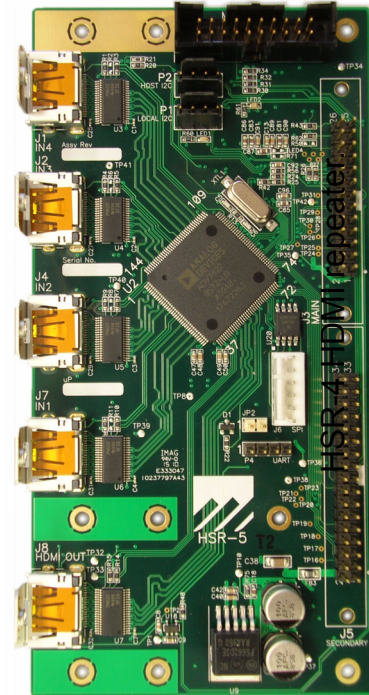
- Decoders
 - DTS-96/24, DTS-ES Discrete, DTS-HD Master
 - Dolby Digital/Plus, TrueHD
 - PCM-96/24
 - AAC (optional)
- Matrix Processing
 - Pro Logic IIx, Dolby Digital EX
 - DTS-ES Matrix, DTS Neo:6 2-channel
- Post Processing
 - Comprehensive Bass Management
 - Tone Controls, 7-Channel Stereo/Mono
 - 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-77 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.

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.

Companion expansion cards

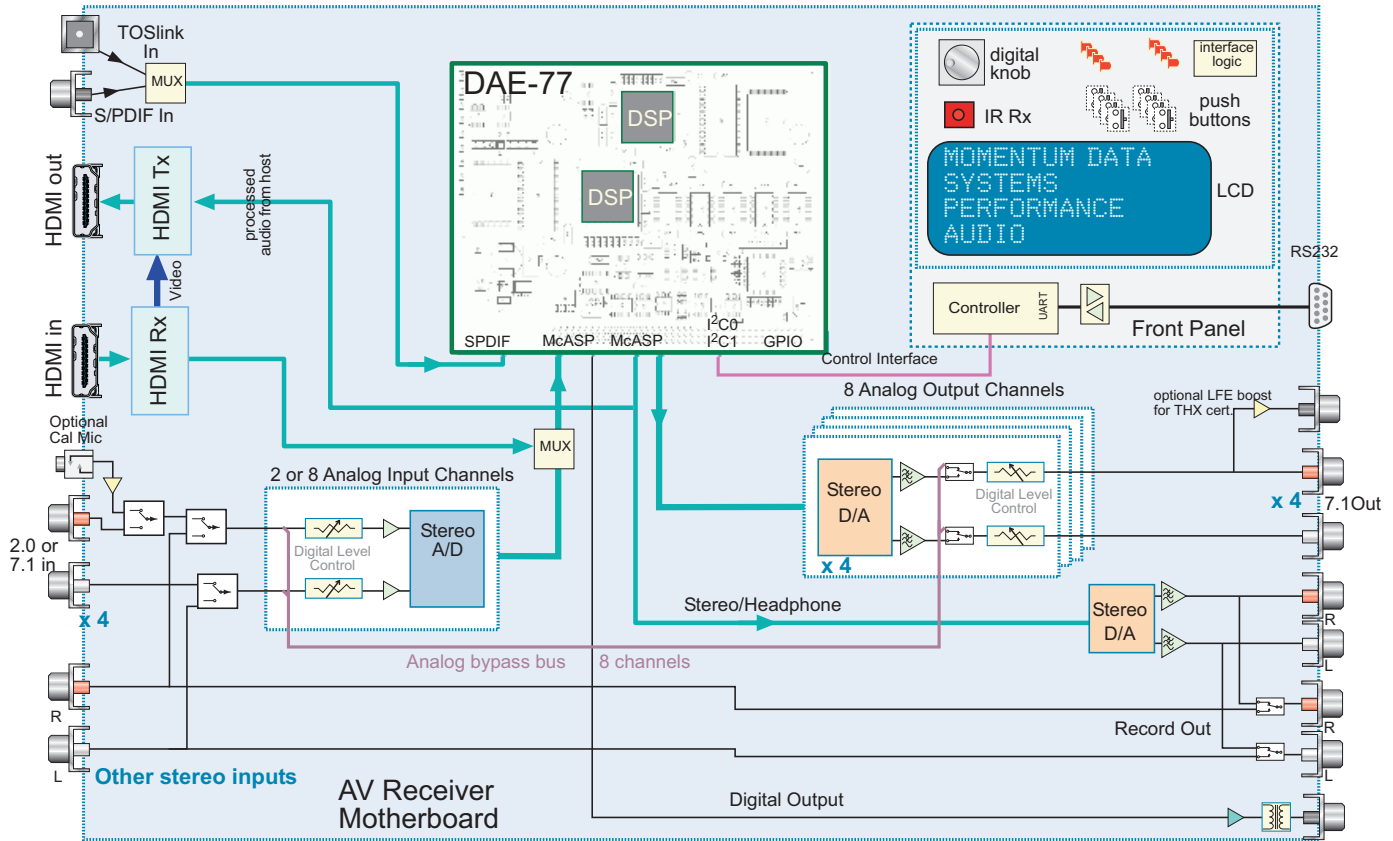
- 6 additional channels of A/D for 5.1 analog input
- HDMI cards (all support HDMI 1.4/3D video):
 - HSR-8-3D : 8:1 HDMI repeater (expandable to 12 in) with dual output
 - HSR-5: low cost 4:1 HDMI repeater module with basic OSD
 - VPROC: full featured video switching/scaling/picture improvement subsystem with HDMI and analog video, high quality OSD



HSR-5 HDMI repeater/switcher with OSD

DAE-77 : Dual DSP Digital Audio module

Application Diagrams



AV Receiver with processing of analog, SPDIF, and HDMI inputs

Ultimate flexibility for unique AV Receiver systems

Since the DAE-77 only provides digital functionality, OEMs are free to match it up with sophisticated analog and mixed signal sections to achieve their own unique brand identity.

This flexibility, in some applications, may require assistance from MDS' staff to modify the firmware to support specific features. By providing MDS with complete product specifications the need, if any, for firmware customization can be quickly determined.

DAE-77 : Dual DSP Digital Audio module

Ordering information (order code is in *Italics*)

Shipment of DAE-77 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-77xx: DAE-77 with dual 300MHz DA710 processors for A/V receiver applications

77xx 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.

Consulting services are also available from Momentum Data Systems.

DDE-STD: 90 Day Startup Support

- 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.

Specifications

Dimensions: 4.5" x 3.5" (approx 114 mm x 89mm). Bottom to top (mother board top to top of DAE-7 connectors) height .627" (15.9 mm)

Power: +5V (used to create quiet PLL supply), + 3.3V @ 2.25 amps peak

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

A total of 15 I²S lines are available, but usage may vary between specific DAE-77xx 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.



Dolby is trademark of Dolby Laboratories, Inc.

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THX is a trademark of THX Ltd.

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DAE-77 Data Sheet rev 1d Mar 2011 Specifications subject to change

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