



# MOZART

# High Performance Audio Development System

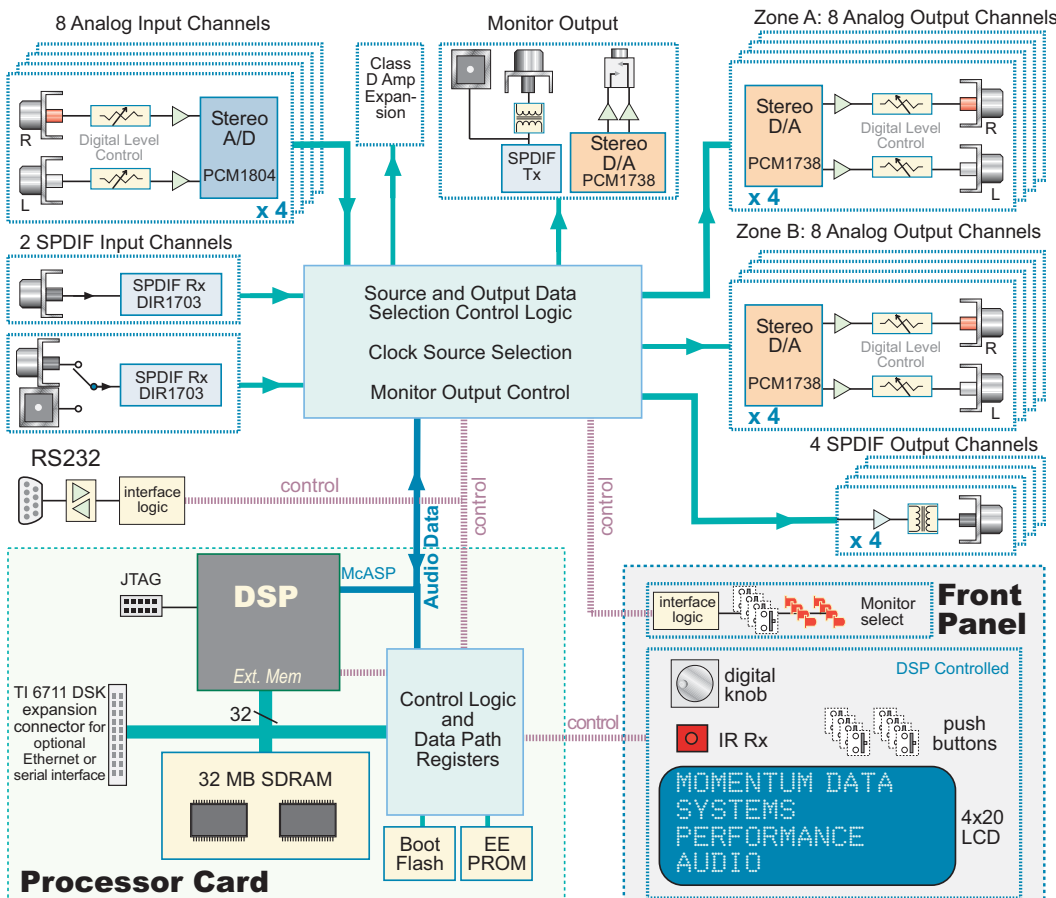
Momentum Data Systems' MOZART high performance audio development system provides a hardware platform and software environment for the development of high quality and feature rich home, professional, and theater audio systems. Based on Texas Instruments (TI) TMS320C671x series of DSPs that provide 1800 MIPS of programmable DSP and 32/64 bit floating point calculations, the MOZART platform combines superior DSP with extremely high quality analog circuit design and layout.

This attention to sonic quality allows for critical evaluation of decoder and post-decode processing software. MOZART's hardware is matched by the equally impressive *Performance Audio Framework* for software development. The software toolkit, in conjunction with TI's Code Composer Studio IDE, provides the most powerful environment available anywhere for home theater system audio development.

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, parametric EQ, and surround synthesis.

With support for decoders like Dolby Digital™, DTS™, and THX™, equipment designers can save man-years of development time and instead focus on features for product differentiation. The *Performance Audio Framework* datasheet has a complete list of available software and libraries.

MOZART III is the perfect platform for development of professional audio applications, including encoders and sound field processors that can benefit from the large dynamic range offered by the 32/64 bit floating point capability of the TMS320C6713 DSP.



### MOZART II

- DSP: 225 MHz DA610
- ROM on DSP for Dolby and DTS decode functions

### MOZART III

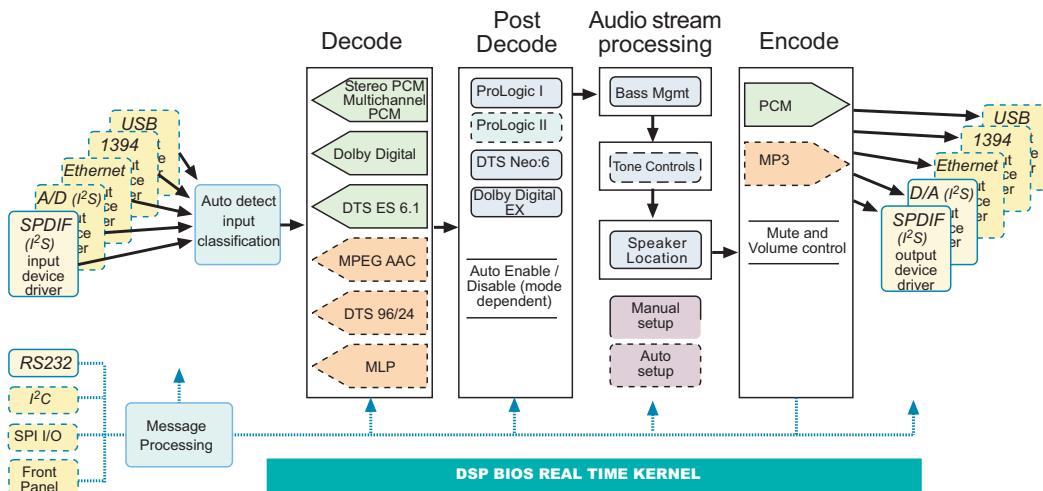
- DSP: 225 MHz TMS320C6713
- No ROM in DSP

### Common features

- 8 analog, 2 digital (SPDIF) inputs
- two output zones with 8 analog channels each
- 4 digital (SPDIF) outputs
- analog input > 96 dB THD+N
- analog outputs > 97 dB THD+N
- digitally controlled levels on all inputs and outputs for maximum dynamic range
- decode two different inputs to the two output zones simultaneously
- front panel controlled by DSP
- monitor output front panel selectable
- flash memory for program storage
- EEPROM for settings retention
- 32MB SDRAM



# MOZART : High Performance Audio Development System



The Performance Audio Framework (PA/F), pictured at right, creates a modular software development environment. Drivers, codecs, and processing can be inserted into the chain without disrupting the environment.

The diagram shows the standard modules offered with MOZART II with solid lines. Dashed modules are optional and/or in development.

See the *Performance Audio Framework* datasheet for complete information

## The system software consists of:

**Performance Audio Framework (PA/F).** This is the glue that bolts all of the modules together in the above software block diagram and provides system level wrappers for the algorithmic libraries. This architecture facilitates artifact-free audio applications. Its extensibility allows differentiation of end-equipment.

**Decode/Encode/Processing Libraries.** These libraries, such as AC-3, Pro Logic, DTS, AAC, etc., are based on TI's XDAIS algorithmic standard.

**DSP BIOS.** This DSP operating environment from TI provides a multi-tasking environment for the software operation

**SIO drivers.** These drivers appear as streams to the system, simplifying the real-time interaction between real world I/O and the libraries.

**Code Composer Studio.** TI's Integrated Development Environment (IDE) for the C67x devices.

## Autonomous "Micro-free" Operation

- PA/F enables the DSP to operate with no host microprocessor control
- Decoders are automatically invoked from internal ROM
- PA/F automatically handles most error situations
- PA/F default settings are reasonable but can be changed

### Benefits:

- Reduces microcontroller code-storage costs
- Lessens microcontroller development work
- Shortens time-to-market
- Improves system reliability
- Minimizes missed audio data and audio artifacts due to communication interactions.

Modular software approach combined with MOZART hardware reduces development risk and time to market. Using MOZART hardware as a reference platform allows software development to proceed concurrently with hardware development.

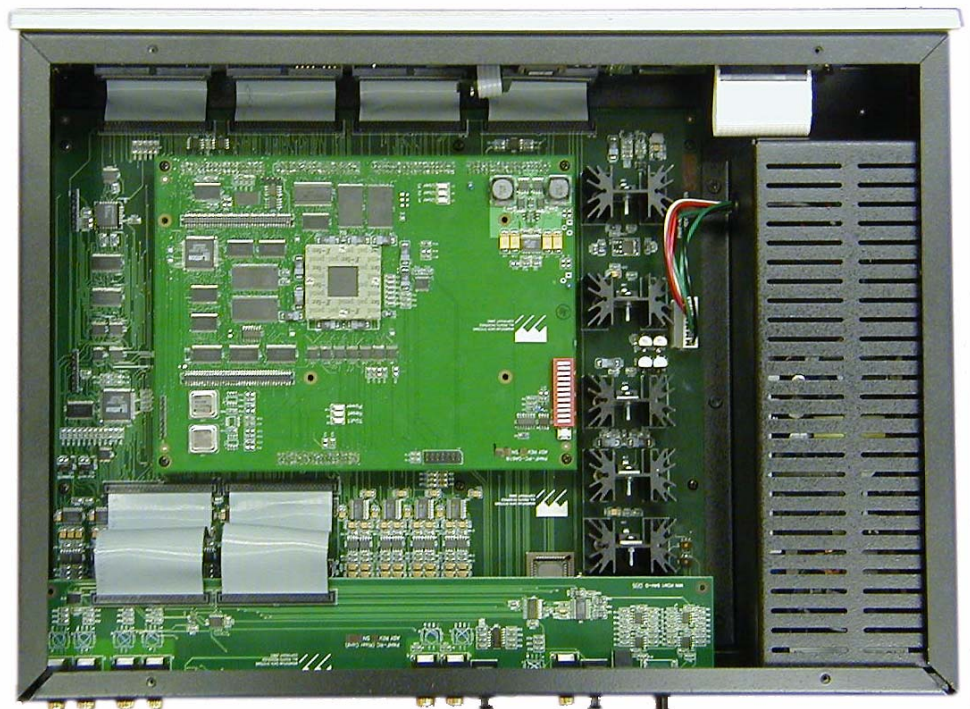
The modular device driver allows easy substitution of interfaces to specific I/O hardware.

The framework allows easy insertion of new audio chain algorithms to simplify product customization.

The modular "plug-in" nature of the decoders and encoders ensures that a single system design can span a range of product features and accommodate emerging audio standards.

## Out of the box operation

The MOZART II systems come with flash preloaded with an audio decoder type application and front panel control software that allows operation of the unit in a manner similar



# MOZART : High Performance Audio Development System

to home theater audio systems, including source selection and volume control. Operation of Dolby Digital and DTS decoders is included.

The MOZART III system comes with a similar preloaded program except no decoders are included. Any stereo input source can be selected and output to any stereo output.

The toolkit for the development system includes the source files and step by step instructions for rebuilding these applications and downloading to the flash.

A Windows based GUI program included in the SDK can also be used to control Mozart's operation via an RS232 port.

## Hardware Specifications

**Preliminary, all performance specifications subject to change**

### Analog input stage

- 10 k $\Omega$  input impedance
- $\pm 150$ mV to  $\pm 10$ V for FS A/D output
- AC Coupled, 3dB bandwidth: 3 Hz - TBD kHz
- PGA2310 Digitally controlled analog volume control
- Anti-Aliasing filter: 1st order, Fc = TBD kHz
- gain and SE to DI conversion stage (per input): dual OPA2134
- A/D: PCM1804 24 bit delta-sigma A/D
- Sample clock:
  - slave to SPDIF
  - internal osc: 32, 44.1, 48, 96, 192 kHz.
- Typical performance
  - Fs = 48 kHz, 1kHz FS input: >96 dB THD+N
  - Fs = 192 kHz, 1kHz FS input: >95 dB THD+N

### SPDIF coax input

- 75 $\Omega$  input impedance, transformer coupled with DC blocking cap
- DIR1703 Receiver
- 32 kHz to 96 kHz sample clock recovery with 75 psec jitter (typical)

### SPDIF optical input

- GP1F32R optical receiver

### Analog output stage

- 50  $\Omega$  output impedance
- $\pm 10$ V for FS D/A output at max level
- PGA2310 Digitally controlled analog volume control
- DC Coupled output
- Anti-Imaging filter: 3rd order, Fc = TBD kHz
- D/A: PCM1738 24 bit delta-sigma A/D, Fs max 192 kHz
- I/V converter and filter stage op amps: OPA2227 and OPA2134
- Sample clock: slaves to input source for that zone
- Typical performance
  - Fs = 48 kHz, 1kHz FS output: >97 dB THD+N

- Fs = 48 kHz, -26 dBFS output: >107 dB S/N
- output crosstalk: 1kHz FS output to any other output > 90 dB

### SPDIF coax output

- 75 $\Omega$  output impedance, transformer coupled
- Bi-phase output generated by DSP CPU

### Monitor Output

- SPDIF coax, optical, and stereo analog output
- 3.5 mm stereo analog output jack with level control
- Any input or output can be directly fed to monitor (including raw SPDIF bit-streams)

### Processor Card (all include std. 14 pin JTAG)

- Mozart II
  - 225 MHz DA610 DSP with ROM based Performance Audio Framework with built in Dolby Digital, DTS, and THX decode
- Mozart III
  - 225 MHz TMS320C6713 DSP

### Front Panel

- DSP connected peripherals:
  - 10 push buttons
  - digital knob: CTS-V288
  - 4 x 20 LCD display: ASI-G-204AA/W
  - IR receiver: GP1U101X
- Monitor control
  - PIC18C442 controller
  - 4 navigation switches
  - 18 LEDs to show monitor selection
- Brushed aluminum finish

### Power

- Universal 100/120/220 input
- IEC cord plug (line cord supplied for North America only)

### Mechanical

- 2U rack mountable enclosure
- enclosing dimensions: 44 x 10.5 x 31.5 cm (17.2 x 4.1 x 12.4 in.) excluding rack mount ears and connector protrusion

## Software Specifications

- Please see the *Performance Audio Framework* Datasheet for software information

Multiple analog and digital inputs and outputs allow emulation of even the most sophisticated system designs





# MOZART : High Performance Audio Development System

## Ordering information (order code is in *Italics*)

To develop DA610 or TMS320C6713 based applications you must order a MOZART -II, or -III unit, and purchase CCS and JTAG emulator from Texas Instruments (available on-line via TI's e-store or from your local TI distributor).

**MOZART-II:** Mozart II unit with 225 MHz DA610 processor module. Must be Dolby licensee.

- Open Audio Software Development Kit (SDK) with home theater and general audio algorithms, and device driver libraries
- Source code to example applications and device drivers used by the DSP
- Windows GUI software to emulate front panel operation via the MOZART unit's RS232 port
- 90 Day Getting Started support

**MOZART-III:** Mozart III unit with 225 MHz TMS320C6713 based processor module

- Open Audio Software Development Kit (SDK) with general audio algorithm and device driver libraries
- Source code to example applications and device drivers used by the DSP
- Windows GUI software to emulate front panel operation via the MOZART unit's RS232 port
- 90 Day Getting Started support

Consulting and porting services are also available from Momentum Data Systems.

## Related items

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

*S004-W-SFX* QEDesign2000™ Advanced DSP Filter Design Software for Windows

## Support

Please see the Mozart Developer Support datasheet for information about the 90 Day Getting Started Support and other support options.

## Other information

Please check MDS website for MOZART III availability.

Use of the DA610 DSP requires certain licenses and payments to patent holders of decoder algorithms. Please contact MDS for details.

## Ethernet

For development of system using Ethernet communications, the Texas Instruments Network Development Kit (NDK) is needed. This kit includes the TCP/IP software stacks and the Ethernet daughtercard that connects to the DSK connector on the processor module. For more information see TI document SPRU568, "TMS320C6000 TCP/IP Network Developer's Kit (NDK) Technical Data Quick Reference Guide."



Dolby is a trademark of Dolby Laboratories, Inc.

DTS is a trademark of Digital Theater Systems, Inc.

THX is a trademark of THX Ltd.

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