

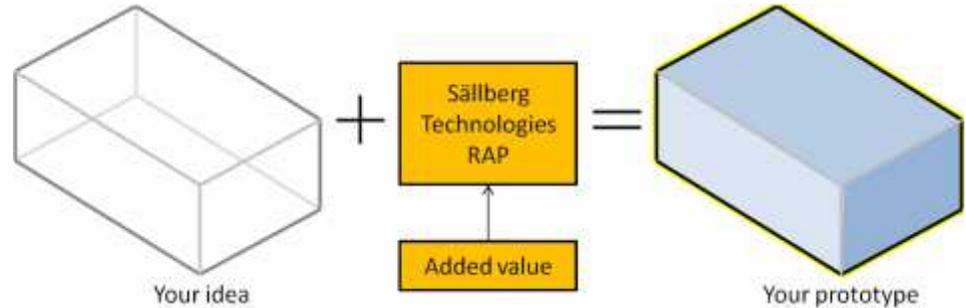
Rapid Audio Prototyping

Rapid Audio Prototyping

- Do You want to combine research and prototyping in one step?
- Do You want to test and evaluate the audio processing chain of Your product idea already at an early stage in the development process?
- Do You want to convince management and financiers that Your concept idea is worth funding and resources?
- Do you want to get a head's start in the product development?

Sällberg Technologies' Rapid Audio Prototyping (RAP) answers these questions by bringing well proven signal processing technology to You! RAP is a highly cost-efficient way for You to initiate product development and to reach the market before Your competitors.

Let Sällberg Technologies' experience boost Your development efforts and to save precious time while materializing Your idea.



Intended Audience

RAP is intended for companies requiring rapid prototyping and development of products containing an audio signal chain. Attach the RAP to Your signal chain and off You go. The RAP 4 Matlab ¹⁾ brings this concept further by combining research and prototyping for realtime audio processing using conventional Matlab scripts.

RAP Product Selection Table

RAP	Inputs/Outputs	Description	Example Application
RAP 4 Matlab	?/? ²⁾	Allows You to do research and prototyping for realtime signal processing in Matlab, which drastically cuts down Your time to product.	Research-level and proof of concept development of audio processing algorithms using conventional Matlab programming.
RAP Extreme	12/12	High performance floating point digital signal processor (Peak 1.2GFLOPS). 4 inputs and 4 outputs have extremely low delay.	Active control and advanced audio signal processing applications.
RAP Advanced	8/8	High performance floating point digital signal processor (Peak 1.2GFLOPS).	Advanced audio signal processing applications.
RAP Performance	6/3	High performance and low power fixed point digital signal processor (Peak 240MIPS) with hardware accelerated signal processing functions.	Low power and battery operated applications.

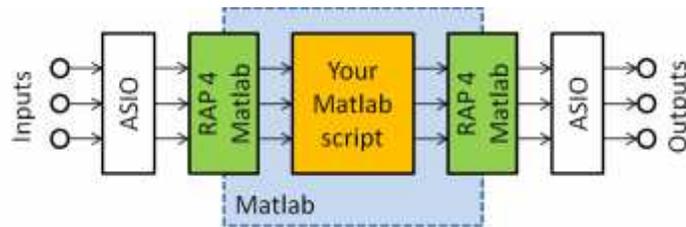
1) Matlab is a registered trademark of The Mathworks Inc.

2) The number of inputs and outputs in RAP 4 Matlab is limited only by the number channels in Your ASIO sound card, and the processing performance of your computer's CPU.

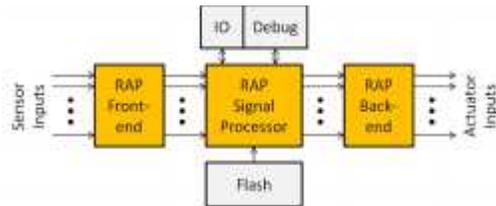
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RAP Technical Overview

RAP 4 Matlab bridges Your Matlab scripts and Your low-latency ASIO-compatible sound card. This means You can evaluate Your Matlab scripts in realtime without having to regard hardware-related prototyping issues. The pre-requisites for using RAP 4 Matlab is that You have Matlab and an ASIO compatible sound card installed. If You can write conventional Matlab scripts, You can use RAP 4 Matlab!



As opposed to RAP 4 Matlab, the modules RAP Extreme, RAP Advanced and RAP Performance are highly advanced and stand-alone signal processor-based circuit boards. These can either be used out-of-the box as a stand-alone application for proof-of-concept situations or You can tap them into the audio chain of an existing hardware to get a product-like behavior of Your prototype.



The high processing performance of the RAP DSP-modules supports advanced and demanding signal processing. The large number of RAP processing channels allows for temporal and spatial signal processing applications

such as source tracking, signal extraction, adaptive beam forming etc. The versatility of the RAP sensor signal front- and back-end allows it to interface with different sensor types, e.g., line level or microphones, and to drive loudspeakers and head-phones. The RAP digital processors can also be used to load balance non-signal processing tasks in Your system.

The RAP Extreme, -Advanced and -Performance, are self contained audio signal processing systems that come bundled with software and basic signal processing functions to give You an out-of-the box head's start in Your project development. Schematics and BOMs are also included. The RAP signal processing systems are equipped with signal conditioning circuitry, flash memory and a high-end digital signal processor. Supplied with 1.8 to 3.6 VDC they contain all power management on board.

Example Application

The RAP Advanced has, for instance, been used to construct a prototype for an eight-microphone portable sound analysis device.

Plugged to a motherboard PCB, the RAP performs the advanced spatiotemporal signal analysis. The RAP further controls a display to give instant user feedback. A USB interface on the motherboard is used to transmit live data back to the host PC for further processing and storage.

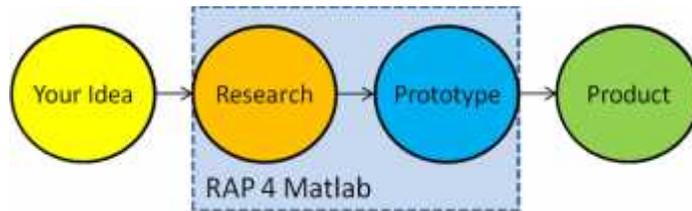
The RAP Advanced has dramatically cut down development time and costs for this advanced prototype.



Specification - RAP 4 Matlab

Description

The RAP 4 Matlab is intended for research-level and proof of concept situations where You require an extremely short time between Your idea and a realtime demo. It is also suitable when You want to develop new audio-processing algorithms or while fine-tuning the performance of Your existing solution.



The RAP 4 Matlab is a software package that combines research and prototyping in one step. It acts as a glue between Your Matlab-scripts and the ASIO-compatible sound card installed on Your system. Develop Your product idea in Matlab, using conventional Matlab programming, and let RAP 4 Matlab bring realtime signal processing directly to You. This means that by pressing F5 (Run) in Matlab, You will be able to hear and evaluate Your Matlab-software in real time. Use this opportunity to convince management and financiers already at an early stage in Your project.

By relying upon the ASIO standard, the RAP 4 Matlab yields a high fidelity audio quality with an ultra low signal delay. The number of channels is limited only by the ASIO sound card installed on Your system and the processing capabilities of Your computer's CPU.

Sample Application

As an example, RAP 4 Matlab has been used to implement and evaluate an eight channel blind signal extraction algorithm. The algorithm intelligently combines up to 256 frequency bands of each input channel so as to extract target signal components from the observed noisy signal mixture and to suppress undesired noise sources.

The RAP 4 Matlab is the ultimate tool to bridge research and prototyping of audio algorithms by conventional Matlab programming.

Example Applications

Realtime development and evaluation of audio algorithms. Realtime filtering and processing of signals for studio applications.

Package Bundle

- CD with RAP 4 Matlab software package

Not included: Matlab software license, ASIO sound card or computer.

Requirements

The RAP 4 Matlab requires that Matlab and an ASIO-compatible sound card are installed on the host computer. It is required that the host computer runs the Windows XP, Vista or Windows 7 operating system in 32 or 64 bits.

Pricing and Availability

Contact us for more information about pricing and availability.

Web: <http://www.sallberg.at/?contact>

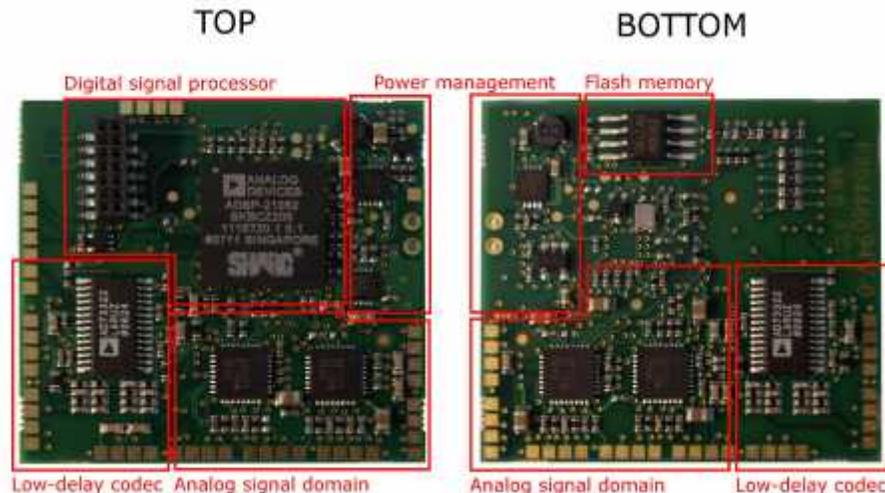
Specification - RAP Extreme

Description

The RAP Extreme is the topline of Sällberg Technologies' RAP modules. The module is an extension of the RAP Advanced. It is based on the Sharc ADSP21262 high performance digital signal processor from Analog Devices.

The RAP Extreme contains 12 input analog to digital converter channels, each capable of powering and amplifying low level sensor signals or line input signals. The 12 output digital to analog converter channels can either be driving loudspeakers or headphones, or line output level signals. All signal routing and conditioning is configured in software.

Four of the RAP Extreme's input and output channels have extremely low throughput delay. It makes this module particularly suitable for active control applications.



Example Applications

Low delay applications such as active noise and vibration control, advanced audio processing applications such as source tracking, signal separation, adaptive beamforming, adaptive filters, pattern recognition and classification...

Specification

Processing power:	1.2 GFlops Peak, 800 MFlops sustained
Numerical format:	32 bit floating point and 16/32 bit fixed point
Supply Voltage:	1.8 to 3.6 V DC
SNR:	100 dB
Sampling frequency:	Max. 96 kHz (64 kHz for low delay channels)
Interface:	68 solder pads
Inputs:	8 input channels + 4 low delay input channels
Outputs:	8 output channels + 4 low delay output channels
PCB Dimensions:	40 x 36 mm

Package Bundle

- RAP Extreme PCB,
- CD with sample input-output signal passthrough software project

Not included: Analog Devices Visual DSP 5.0, Debug/emulator interface.

Requirements

The RAP Extreme requires that an Analog Devices Sharc DSP compatible software development environment and that a compatible debug and emulator interface are installed on the host computer.

Pricing and Availability

Contact us for more information about pricing and availability.

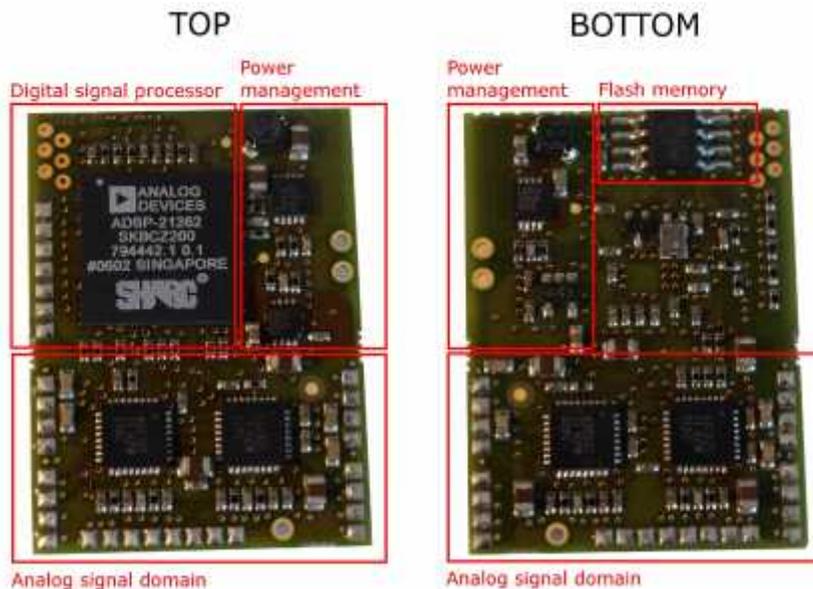
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Specification - RAP Advanced

Description

The RAP Advanced is the premium of Sällberg Technologies' RAP modules. It is based on the Sharc ADSP21262 high performance digital signal processor from Analog Devices.

The RAP Advanced contains eight input analog to digital converter channels, each capable of powering and amplifying low level sensor signals or line input signals. The eight output digital to analog converter channels can either be driving loudspeakers or headphones, or line output level signals. All signal routing and conditioning is configured in software.



Example Applications

Advanced audio processing applications such as source tracking, signal separation, adaptive beamforming, adaptive filters, pattern recognition and classification, signal equalization, dynamic range compression...

Specification

Processing power:	1.2 GFlops Peak, 800 MFlops sustained
Numerical format:	32 bit floating point and 16/32 bit fixed point
Supply Voltage:	1.8 to 3.6 V DC
SNR:	100 dB
Sampling frequency:	Max. 96 kHz
Interface:	4 x 32 pin connector or 55 solder pads
Inputs:	8 input channels
Outputs:	8 output channels
PCB Dimensions:	26 x 67 mm, 55 x 55 mm for pin connector version

Package Bundle

- RAP Advanced PCB,
- CD with sample input-output signal passthrough software project

Not included: Analog Devices Visual DSP 5.0, Debug/emulator interface.

Requirements

The RAP Advanced requires that an Analog Devices Sharc DSP compatible software development environment and that a compatible debug and emulator interface are installed on the host computer.

Pricing and Availability

Contact us for more information about pricing and availability.

Web: <http://www.sallberg.at/?contact>

Specification - RAP Performance

Description

The RAP Performance is the ultra-low power variant of Sällberg Technologies' RAP modules. It is based on the BelaSigna 300 low power fixed point digital signal processor from ON Semiconductor .

The RAP Performance contains six input analog to digital converter channels, each capable of powering and amplifying low level sensor signals or line input signals. The three output digital to analog converter channels can either be driving loudspeakers or headphones, or line output level signals. All signal routing and conditioning is configured in software.

The RAP Performance is particularly suited for battery powered portable applications requiring a very low energy footprint.

Example Applications

Low power audio processing applications such as signal enhancement, beam-forming, noise reduction. The RAP Performance supports advanced signal processing functions through hardware accelerated signal processing.

Specification

Processing power:	240 MIPS (inkl. hardware acceleration!)
Numerical format:	24 bit fixed point
Supply Voltage:	1.8 to 3.6 V DC
SNR:	100 dB
Samplingfrequency:	Max. 96 kHz
Interface:	3 x 14 pin connector
Inputs:	6 input channels
Outputs:	3 output channels
PCB Dimensions:	25 x 26 mm

Package Bundle

- RAP Performance PCB,
- CD with sample input-output signal passthrough software project

Not included: ON Semiconductor EDK, Debug and emulator interface.

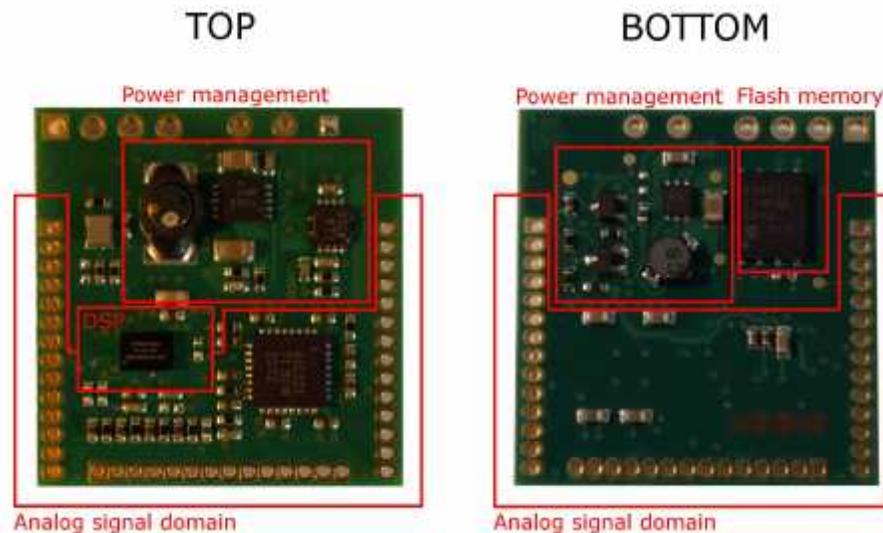
Requirements

The RAP Performance requires that ON Semiconductor EDK 5.0 software development environment and that a compatible debug and emulator interface are installed on the host computer.

Pricing and Availability

Contact us for more information about pricing and availability.

Web: <http://www.sallberg.at/?contact>



What is included in a RAP bundle?

The following is included in the RAP bundles:

- RAP 4 Matlab: contains a CD with the RAP 4 Matlab software.
- RAP Extreme, RAP Advanced, RAP Performance: contains a RAP circuit board plus a CD with sample software for that particular RAP module.

The following is not included, but required to run RAP modules: Computer, Operating system, Matlab, Development environment, Debugger interface.

Custom Support

To further decrease Your time to product, Sällberg Technologies offers its custom support services for You. Our support offer covers, for instance:

- RAP-based research and prototyping
- General RAP support
- Integration of RAP
- Implementation of Your idea into RAP
- Porting of algorithms into RAP

Contact us for more information about custom support and for pricing information.

Web: <http://www.sallberg.at/?contact>

About Sällberg Technologies

Services

We provide services within advanced digital signal processing, research, software development, and related fields. We can support you in any stage of your product's life cycle. Our long signal processing experience together with an extensive third-party network enable us to deliver modern and market-leading solutions.

Motto

Our motto *Innovating the Future* means that we constantly strive to lead the frontline of the current state of the art, providing You innovative and sustainable solutions for the future. We stand for honesty and respect, and our business models are fully transparent. This means that You will be able to follow all aspects and through all stages of our collaboration. The solutions we deliver will meet and go beyond Your expectations!

Vision

We want to be Your first hand's choice when it comes to signal processing development and research. Our expertise will strengthen Your product development team, cutting down time to market and enabling state-of-the art solutions in Your products. We want to help Your business grow!

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Legal Disclaimer

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Sällberg Technologies' RAP modules (including hardware, software and documentation) are intended for research and prototyping. They are **neither** intended for production, **nor** for life- or system critical applications. It is recommended the RAP technology is used only for prototyping and in a controlled, confined and supervised laboratory environment.

While we have made every attempt to ensure that RAP and related information is error free, Sällberg Technologies is not responsible for any errors or omissions, or for the results obtained from the use of this information.

The RAP modules, software, hardware and all other information about RAP is provided "as is", with no guarantee of completeness, accuracy, timeliness or of the results obtained from the use of this information, and without warranty of any kind, express or implied, including, but not limited to warranties of performance, merchantability and fitness for a particular purpose.

In no event will Sällberg Technologies, its related partnerships or corporations, or the partners, agents or employees thereof be liable to you or anyone else for any decision made or action taken in reliance on the information about RAP or for any consequential, special or similar damages, even if advised of the possibility of such damages.

