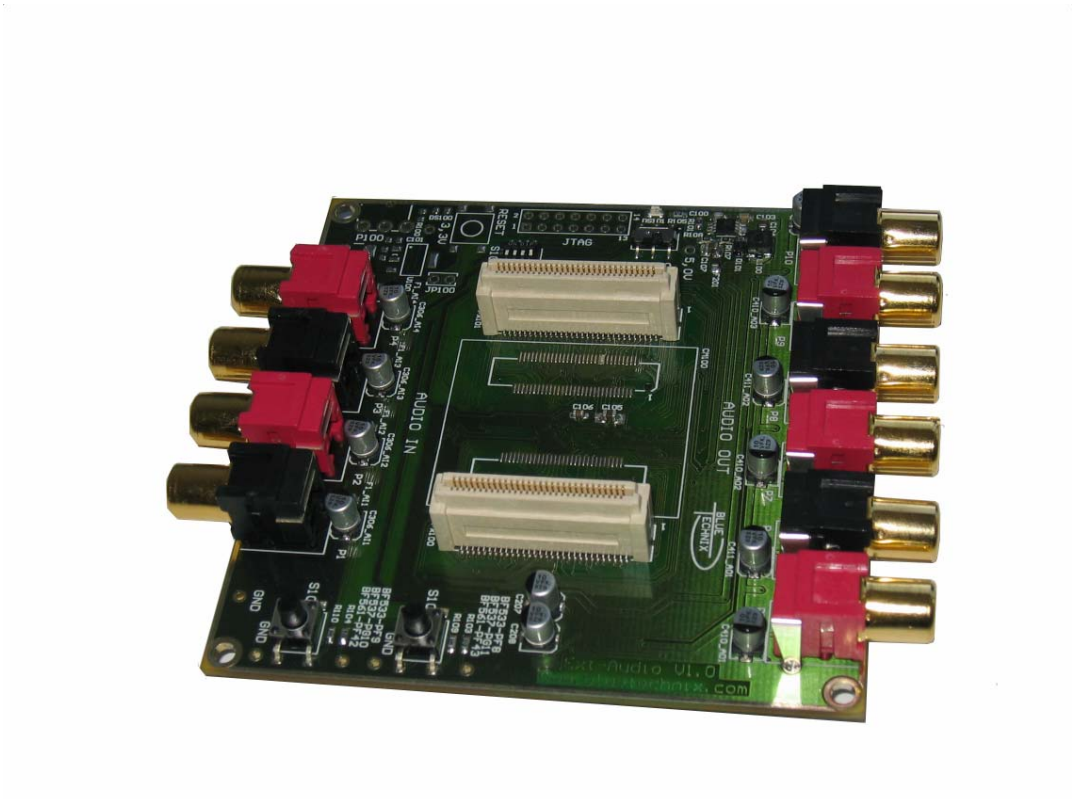
Hardware User Manual



EXT-BF5xx-AUDIO V1.0

www.tinyboards.com

Maximum Power at Minimum Size

Contact

Bluetechnix Mechatronische Systeme GmbH

Waidhausenstr. 3/19
A-1140 Vienna
AUSTRIA/EUROPE
office@bluetechnix.at
http://www.bluetechnix.com

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The information herein is given to describe certain components and shall not be considered as a guarantee of characteristics.
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Information
For further information on technology, delivery terms and conditions and prices please contact Bluetechnix (http://www.bluetechnix.com).

Warnings
Due to technical requirements components may contain dangerous substances.

The Core Boards and Development systems contain ESD (electrostatic discharge) sensitive devices. Electrostatic charges readily accumulate on the human body and equipment and can discharge without detection. Permanent damage may occur on devices subjected to high-energy discharges. Proper ESD precautions are recommended to avoid performance degradation or loss of functionality. Unused core boards and development boards should be stored in the protective shipping package.

BLACKFIN Products

CM-BF533: Blackfin Processor Module powered by Analog Devices single core ADSP-BF533 processor; up to 600MHz, 32MB RAM, 2MB Flash, 120 pin expansion connector and a size of 36.5x31.5mm

CM-BF537U: Blackfin Processor Module powered by Analog Devices single core ADSP-BF537 processor; up to 600MHz, 32MB RAM, 4MB Flash, integrated USB 2.0 Device, 120 pin expansion connector and a size of 36.5x31.5mm

CM-BF537E: Blackfin Processor Module powered by Analog Devices single core ADSP-BF537 processor; up to 600MHz, 32MB RAM, 4MB Flash, integrated TP10/100 Ethernet physical transceiver, 120 pin expansion connector and a size of 36.5x31.5mm

CM-BF561: Blackfin Processor Module powered by Analog Devices dual core ADSP-BF561 processor; up to 2x 600MHz, 32MB RAM, 4MB Flash, 120 pin expansion connector and a size of 36.5x31.5mm

TCM-BF537: Blackfin Processor Module powered by Analog Devices single core ADSP-BF537 processor; up to 500MHz, 32MB RAM, 8MB Flash, 28x28mm, 120 pin expansion connector, Ball Grid Array or Border Pads for reflow soldering, industrial temperature range -40°C to +85°C.

EVAL-BF5xx: Low cost Blackfin processor Evaluation Board with one socket for any Bluetechnix Blackfin Core Module. Additional periphery is available, such as a SD-Card.

EVAL-BF5xxDA: An EVAL-BF5xx including a Debug Agent. Low cost starter development system for Bluetechnix core Modules including VDSP++ Evaluation Software License.

DEV-BF5xx: Blackfin Development Board with two sockets for any combination of Core Modules. Additional periphery is available, such as CF-Card, SD-Card, DP-RAM, Ethernet, USB host and device, multi-port JTAG, connector for a LCD-TFT Display and connector for a digital camera system.

EXT-Boards: The following Extender Boards are available: EXT-BF5xx-Audio, EXT-BF5xx-Video, EXT-BF5xx-Camera, EXT-BF5xx-Experimental, EXT-BF5xx-LVDS, EXP-BF5xx-ETH-USB, EXP-BF5xx-AD/DA. Additional boards based on customer request

BLACKSheep: The BLACKSheep VDK is a multithreaded framework for the Analog Devices Blackfin processor family that includes driver support for a variety of hardware extensions. It is based on the real-time VDK kernel included within the VDSP++ development environment.

LabVIEW: LabVIEW embedded support for the CM-BF537E, CM-BF537U and TCM-BF537 Core Modules based on the BLACKSheep VDK driver Framework.

Notes: For product development it is highly recommended that the developer purchase the *DEV-BF5xx or EVAL-BF5xx (DA)* Blackfin development board and the BLACKSheep VDK low level driver software for the on board peripherals.

BLACKFIN Design Service

Based on over three years Blackfin experience Bluetechnix offers development assistance as well as custom design services and software development.

1 Introduction

The EXT-BF5xx-AUDIO Board is an extender plug-on board for the DEV-BF5xx or the EVAL-BF5xx Board.

1.1 Overview

The EXT-BF5xx-AUDIO Board includes the following components:

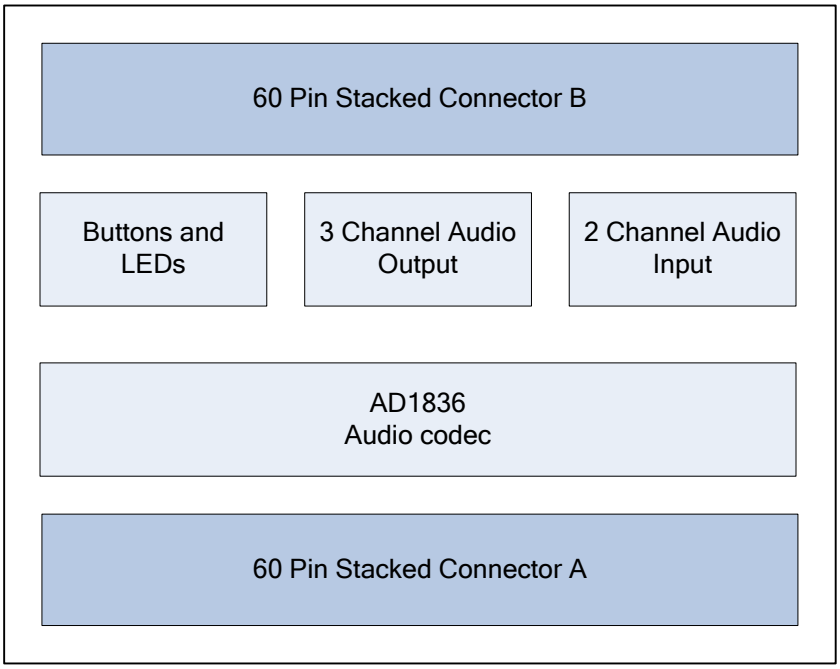

Figure 1-1: Overview of the EXT-BF5xx-AUDIO Board

- **Stacked Connectors**
  - For plug-on to the Bluetechnix DEV-BF5xx and EVAL-BF5xx Boards
- **Audio Interface**
  - Analog Devices AD1836 Audio Codec
    - 5 V Multichannel Audio System
    - Accepts 16-/18-/20-/24-Bit Data
    - Supports 24 Bits and 96 kHz Sample Rate
    - Multibit Sigma-Delta Modulators with Data Directed
    - Scrambling
    - Data-Directed Scrambling ADCs and DACs—Least
    - Sensitive to Jitter
    - Differential Output for Optimum Performance
    - ADCs: –92 dB THD + N, 105 dB SNR and Dynamic Range

- DACs: –95 dB THD + N, 108 dB SNR and Dynamic Range
- On-Chip Volume Control with “Autoramp” Function
- Programmable Gain Amplifier for ADC Input
- Hardware and Software Controllable Clickless Mute
- Digital De-Emphasis Processing
- Supports 256 _ fS, 512 _ fS, or 768 _ fS Master Clock
- Power-Down Mode Plus Soft Power-Down Mode
- Flexible Serial Data Port with Right-Justified, Left-
- Justified, I2S-Compatible and DSP Serial Port Modes
- TDM Interface Mode Supports 8 In/8 Out Using a
- Single SHARC® SPORT

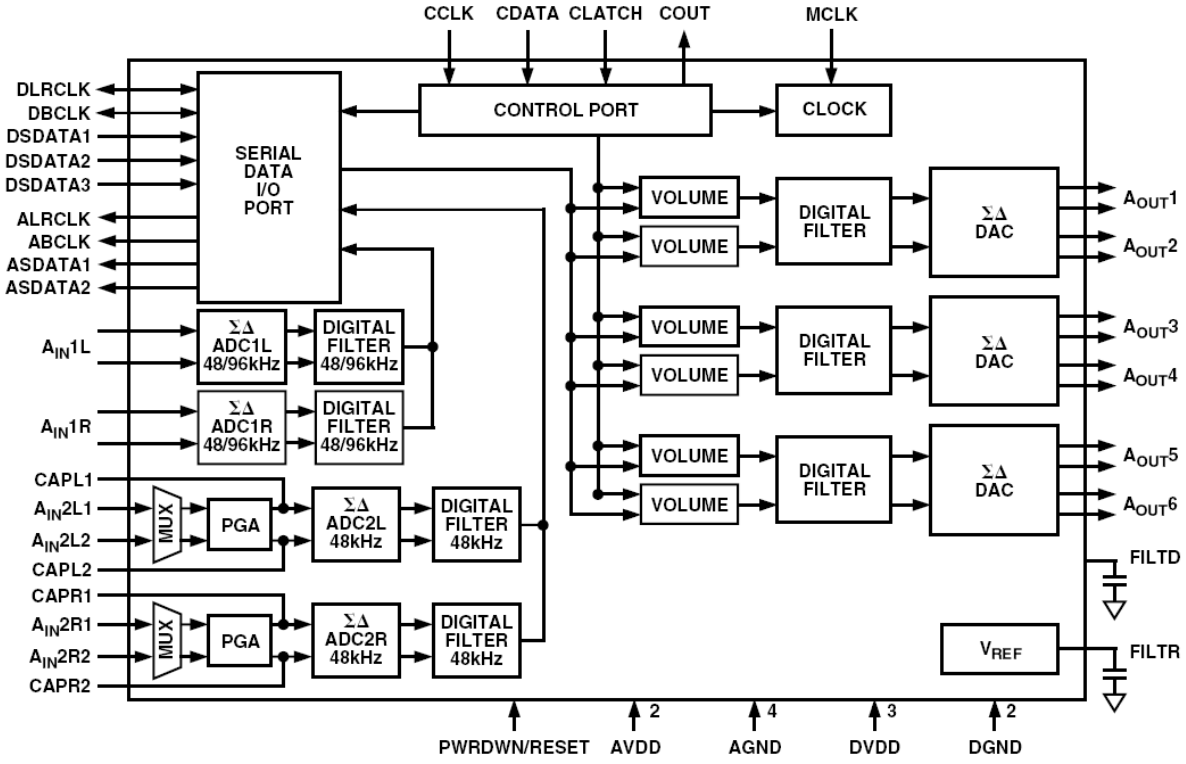

Figure 1-2: Analog Devices AD 1836 Audio Codec

2 Specification

2.1 PCB Placement of connectors

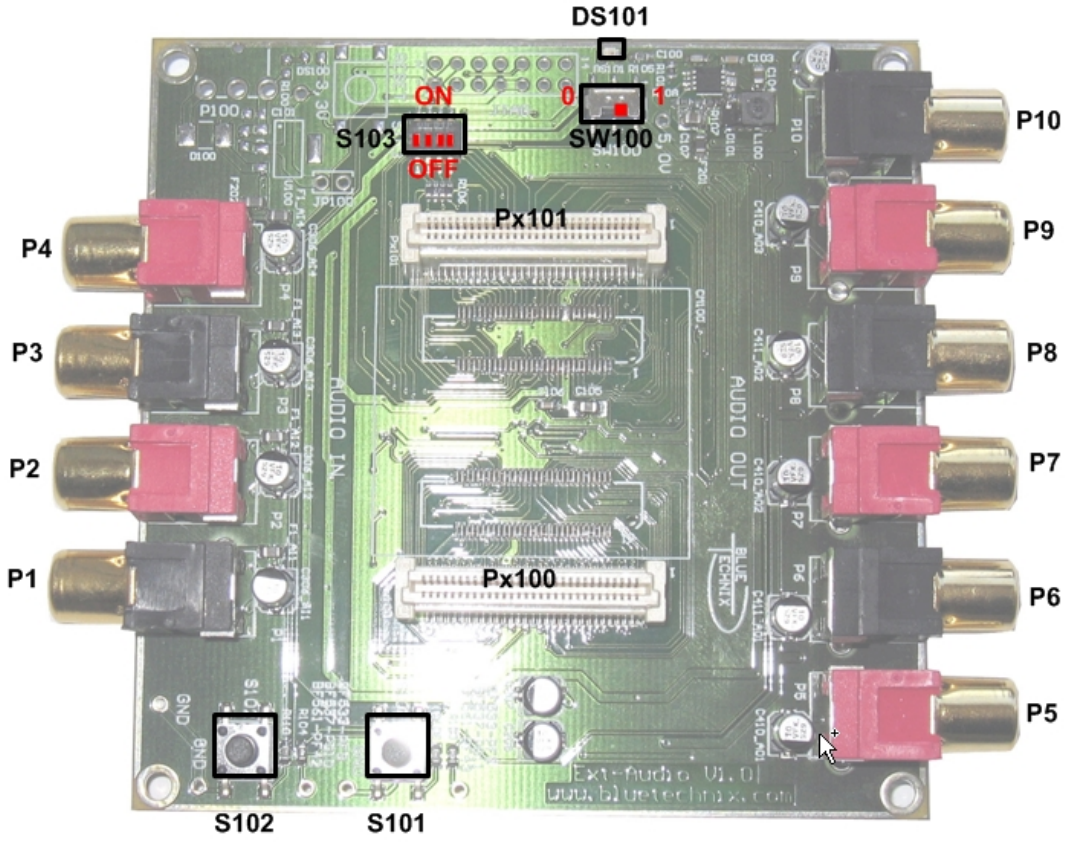

Figure 2-1: PCB Placement of connectors

2.1.1 P1 – P4

P1: Audio IN-1

P2: Audio IN-2

P3: Audio IN-3

P4: Audio IN-4

2.1.2 P5 – P10

P5: Audio OUT-1

P6: Audio OUT-1

P7: Audio OUT-2

P8: Audio OUT-2

P9: Audio OUT-3

P10: Audio OUT-3

2.1.3 SW100

Position 0: CM-BF561, CM-BF537E, TCM-BF537, CM-BF537U

Position 1: CM-BF533

2.1.4 Expansion Connector Types

The Expansion Connectors on the EXT-BF5xx Audio board for a Stacked Height of 16mm are of the following type:

Part	Manufacturer	Manufacturer Part Nr.
Px100, Px101	AMP (Stacked Height = 16mm)	5-5179010-2
Matching connector	AMP	5179031-2

Table 2-1: EXT-BF5xx Audio board connector types

These connectors can be ordered from Bluetechnix.

2.1.5 S103

If you are using switch S102 set switch S103/4 ON.

2.1.6 Buttons and LED

The buttons S101 and S102 are general-purpose input buttons.

The LED DS101 is connected to general-purpose IO pins.

Core Module	**LED DS101**	**S101**	**S102**
CM-BF533	PF4	PF8	PF9
CM-BF537E/U	PG15	PG11	PG10
CM-BF561	PF47	PF43	PF42

2.1.7 SPI CS assigment for the configuration of the Audio Codec

The following table shows the SPI slave select assignment used to configure the audio codec depending on the core modul inserted.

Core Module	SPI CS signal	Pin number
CM-BF533	SPISEL5	18
CM-BF537E/U	SPI_SSEL5	53
CM-BF561	SPICS4	53

2.2 Mechanical Outline

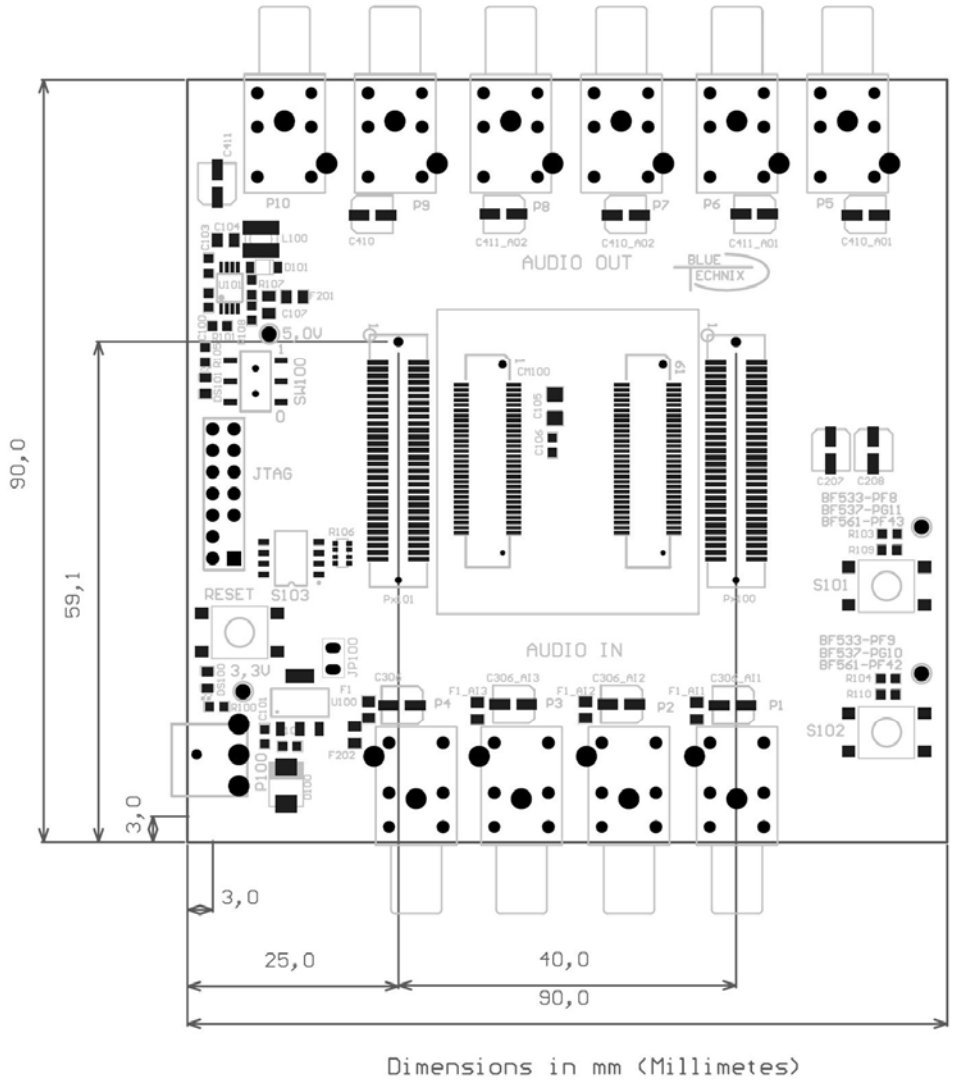

Figure 2-2: Mechanical Outline – Expansion Connector Placement

3 Software Support

3.1 BLACKSheep

The package contains audio software parts of the BLACKSheep VDK multithreaded framework.

Please mind the software development documents.

3.2 uClinux

The Audio Extender Board is supported by the open source platform at http://blackfin.uclinux.org.

In the uClinux-Kernel-Configuration you have to switch on / select:

- Sound Card support
  - Advanced Linux Sound Architecture
    - OSS Mixer API
    - OSS PCM API

    At "ALSA Blackfin devices":
    - AD1836 Audio support
    - Interface: both are working
    - SPORT: 0
    - SPI channel selection bit: 5

4 Known Bugs

5 Revision History

2006-09-08	Release Version 1.0
2006-12-12	SPI CS assignment added

A List of Figures and Tables