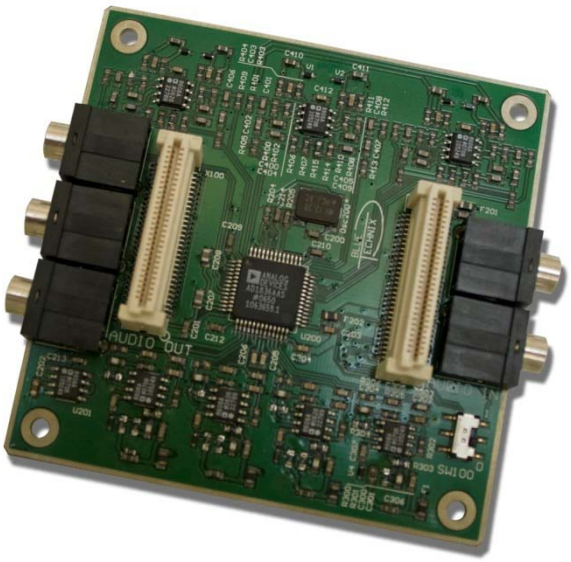
BLUE TECHNIX



Hardware User Manual

EXT-BF5xx-AUDIO v2.x

...maximum performance at minimum space

Contact

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Table of Contents

The information herein is given to describe certain components and shall not be considered as a guarantee of characteristics.

Terms of delivery and rights of technical change reserved.

We hereby disclaim any warranties, including but not limited to warranties of non-infringement, regarding circuits, descriptions and charts stated herein.

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Bluetechnix takes no liability for any damages and errors causing of the usage of this board. The user of this board is responsible by himself for the functionality of his application. He is allowed to use the board only if he has the qualification. More information is found in the General Terms and Conditions (AGB).

Information

For further information on technology, delivery terms and conditions and prices please contact Bluetechnix (http://www.bluetechnix.com).

Warning

Due to technical requirements components may contain dangerous substances.

The Core Modules and development systems contain ESD (electrostatic discharge) sensitive devices. Electro-static 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 Modules and Development Boards should be stored in the protective shipping

BLACKFIN Products

Core Modules:

TCM-BF518:	The new Core Module CM-BF518 is powered by Analog Devices' single core ADSP-BF518 processor; up to 400MHz, 32MB SDRAM, up to 8MB flash. The 2x60 pin expansion connectors are backwards compatible with other Core Modules.
CM-BF527:	The new Blackfin Processor Module is powered by Analog Devices' single core ADSP-BF527 processor; key features are USB OTG 2.0 and Ethernet. The 2x60 pin expansion connectors are backwards compatible with other Core Modules.
CM-BF533:	Blackfin Processor Module powered by Analog Devices' single core ADSP-BF533 processor; up to 600MHz, 32MB SDRAM, 2MB flash, 2x60 pin expansion connectors 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 SDRAM, 8MB flash, a size of 28x28mm, 2x60 pin expansion connectors, Ball Grid Array or Border Pads for reflow soldering, industrial temperature range -40°C to +85°C.
CM-BF537E:	Blackfin Processor Module powered by Analog Devices' single core ADSP-BF537 processor; up to 600MHz, 32MB SDRAM, 4MB flash, integrated TP10/100 Ethernet physical transceiver, 2x60 pin expansion connectors 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 SDRAM, 4MB flash, integrated USB 2.0 Device, 2x60 pin expansion connectors and a size of 36.5x31.5mm.
CM-BF548:	The new Blackfin Processor Module is powered by Analog Devices' single core ADSP-BF548 processor; key features are 64MB DDR SD-RAM 2x100 pin expansion connectors.
CM-BF561:	Blackfin Processor Module powered by Analog Devices' dual core ADSP-BF561 processor; up to 2x 600MHz, 64MB SDRAM, 8MB flash, 2x60 pin expansion connectors and a size of 36.5x31.5mm.
eCM-BF561:	Blackfin Processor Module powered by Analog Devices' dual core ADSP-BF561 processor; up to 2x 600MHz, 128MB SDRAM, 8MB flash, 2x100 pin expansion connectors and a size of 44x33mm.

Development Boards:

EVAL-BF5xx:	Low cost Blackfin processor Evaluation Board with one socket for any Bluetechnix Blackfin Core Module. Additional interfaces are available, e.g. an SD-Card.
DEV-BF5xxDA-Lite:	Get ready to program and debug Bluetechnix Core Modules with this tiny development platform including an USB-Based Debug Agent. The DEV-BF5xxDA-Lite is a low cost starter development system including a VDSP++ Evaluation Software License.
DEV-BF548-Lite:	Low-cost development board with one socket for Bluetechnix CM-BF548 Core Module. Additional interfaces are available, e.g. an SD-Card, USB and Ethernet.
DEV-BF548DA-Lite:	Get ready to program and debug Bluetechnix CM-BF548 Core Module with this tiny development platform including an USB-Based Debug Agent. The DEV-BF548DA-Lite is a low-cost starter development system including a VDSP++ Evaluation Software License.
EXT-Boards:	The following Extender Boards are available: EXT-BF5xx-AUDIO, EXT-BF5xx-VIDEO, EXT-BF5xx-CAM, EXT-BF5xx-EXP-TR, EXT-BF5xx-USB-ETH2, EXT-BF5xx-AD/DA, EXT-BF548-EXP and EXT-BF518-ETH. Furthermore, we offer the development of customized extender boards for our customers.

Software Support:

BLACKSheep:	The BLACKSheep VDK is a multithreaded framework for the Blackfin processor family from Analog Devices 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 Bluetechnix Core Modules is done by Schmid-Engineering AG: http://www.schmid-engineering.ch
uClinux:	All the Core Modules are fully supported by uClinux. The required boot loader and uClinux can be downloaded from: http://blackfin.uClinux.org.

Upcoming Products and Software Releases:

Keep up-to-date with all the changes to the Bluetechnix product line and software updates at: http://www.bluetechnix.com .

BLACKFIN Design Service

Based on more than five years of experience with Blackfin, 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 EVAL-BF5xx (V4.x, or higher) Board, the DEV-BF5xxDA-Lite, the DEV-BF5xx or the DEV-BF5xxDA-FPGA.

1.1. Overview

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

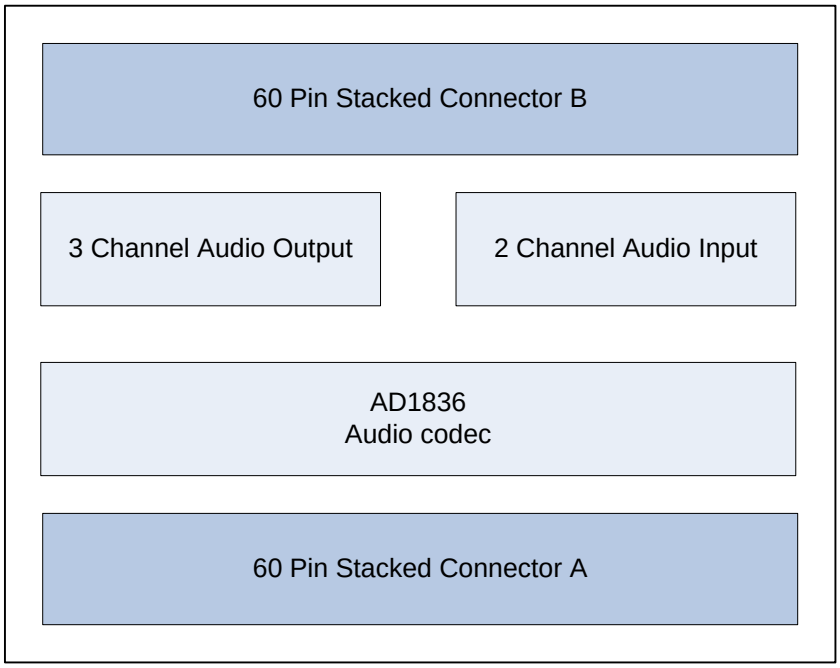

Figure 1-1: Overview of the EXT-BF5xx-AUDIO Board

- **Stacked Connectors**
  - For plug-on to the Bluetechnix EVAL-BF5xx (V4.x, or higher) Board, the DEV-BF5xxDA-Lite, the DEV-BF5xx or. the DEV-BF5xxDA-FPGA
- **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

- 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

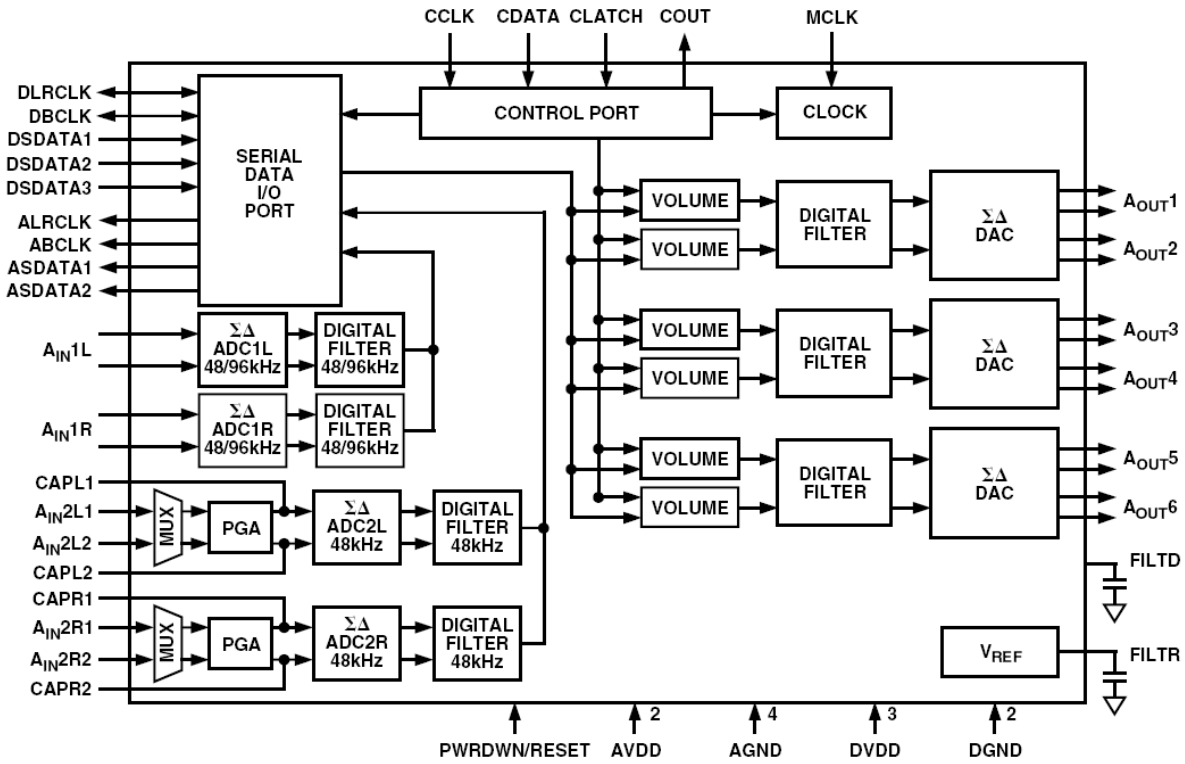

Figure 1-2: Analog Devices AD 1836 Audio Codec

2. Specification

2.1. PCB Placement of connectors

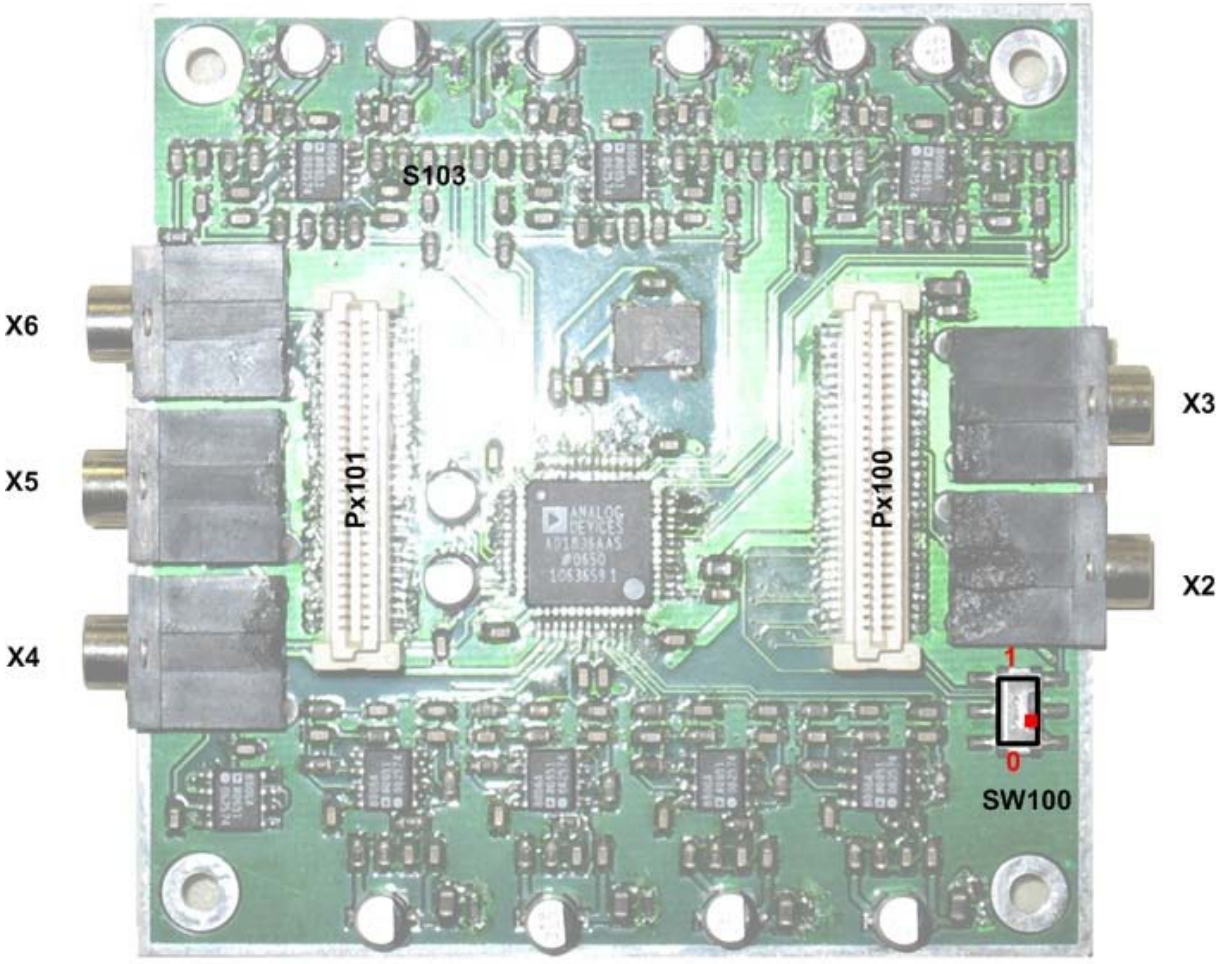

Figure 2-1: PCB Placement of connectors

The connectors (Px100 and Px101) shown in Figure 2-1 are connectors for extender boards, like the EXT-BF5xx-Exp Experimental Extender board, which can be stacked on top of the extender board. The board shown will be stacked with the connectors at the bottom side of the board e.g. to the EVAL-BF5xx Evaluation Board.

2.1.1. P1 – P4

X2: Audio IN-1 and Audio IN 2

X3: Audio IN-3 and Audio IN 2

2.1.2. P5 – P10

X4: Audio OUT-1 and Audio OUT-2

X5: Audio OUT-3 and Audio OUT-4

X6: Audio OUT-5 and Audio OUT-6

2.1.3. SW100

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

Position 1: CM-BF533, CM-BF548, CM-BF518

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. SPI CS assignment 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 Module inserted.

Core Module	SPI CS signal	Pin number
CM-BF533	SPISEL5	18
CM-BF537E/U	SPI_SSEL5	53
CM-BF561	SPICS4	53
CM-BF548	PD14	18
TCM-BF518	PF14	18

Table 2-2: SPI CS signals

2.2. Mechanical Outline

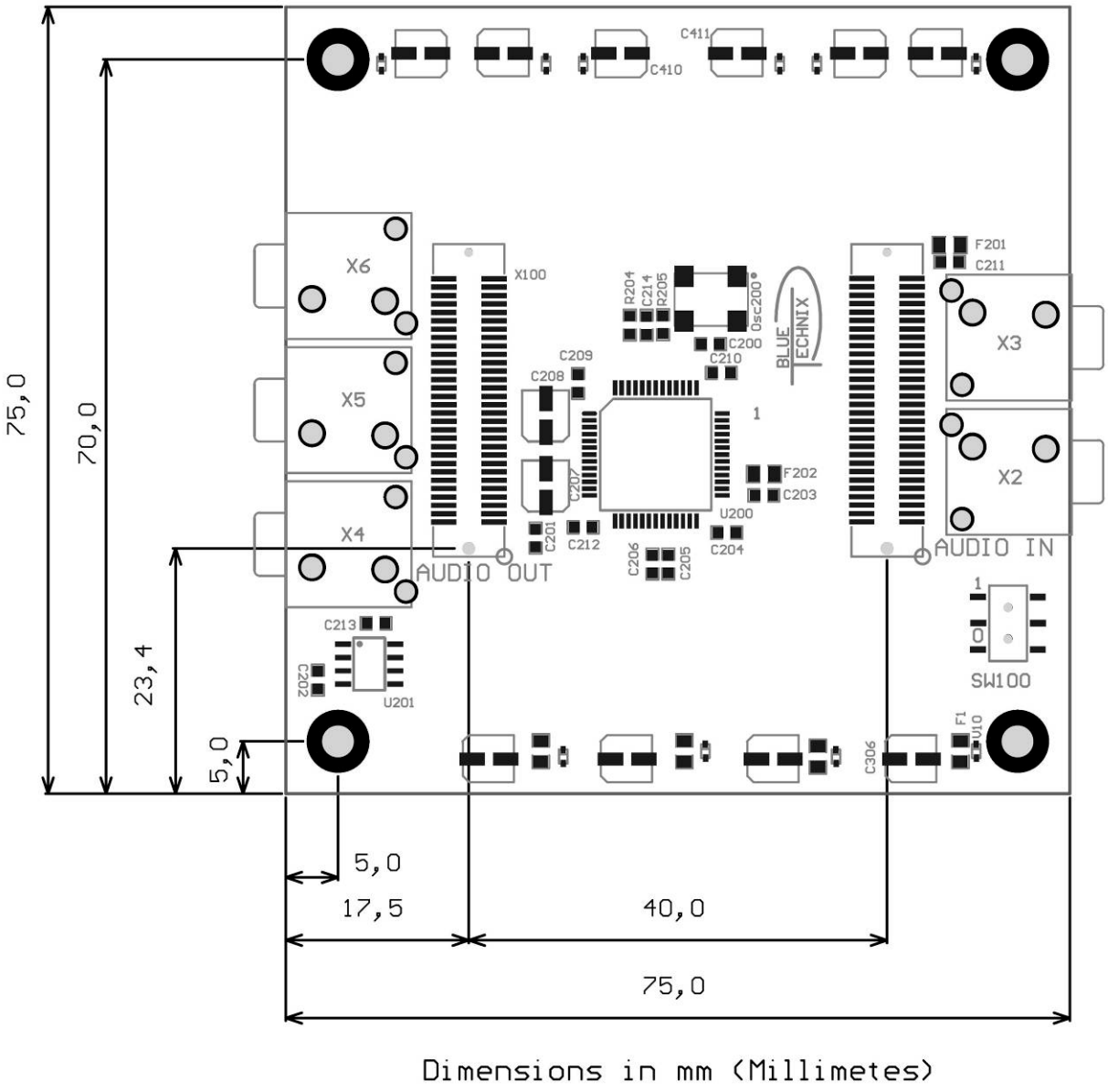

Figure 2-2: Mechanical Outline – Expansion Connector Placement

3. Software Support

3.1. BLACKSheep Driver

The current version of the BLACKSheep extender board driver can be downloaded at the Bluetechnix website (http://www.bluetechnix.com).

Refer to the "README.TXT" files within the examples to see which hardware configuration the example needs.

Please consult 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: see Table 3-1

Core Module	SPI CS signal	bit
CM-BF533	SPISEL5	5
CM-BF537E/U	SPI_SSEL5	5
CM-BF561	SPICS4	4

Table 3-1: SPI channel selection bit

4. Anomalies

Table 4-1: Anomalies

5. Product Changes

Version	Changes
1.0 to 2.1	Board Redesign

Table 5-1: Product Changes

6. Document Revision History

Version	Date	Document Revision
4	2010-07-13	Support for CM-BF548 and TCM-BF518 added
3	2008-08-14	English checked for grammar, spelling and clarity
2	2008-05-23	Additional information for Figure 2-1
1	2007-05-18	Initial release of the Document for Revision V2.1

Table 6-1: Document Revision History

7. Abbreviations

n.c. not connected

n.s. not supported

A List of Figures and Tables

Figures

Tables