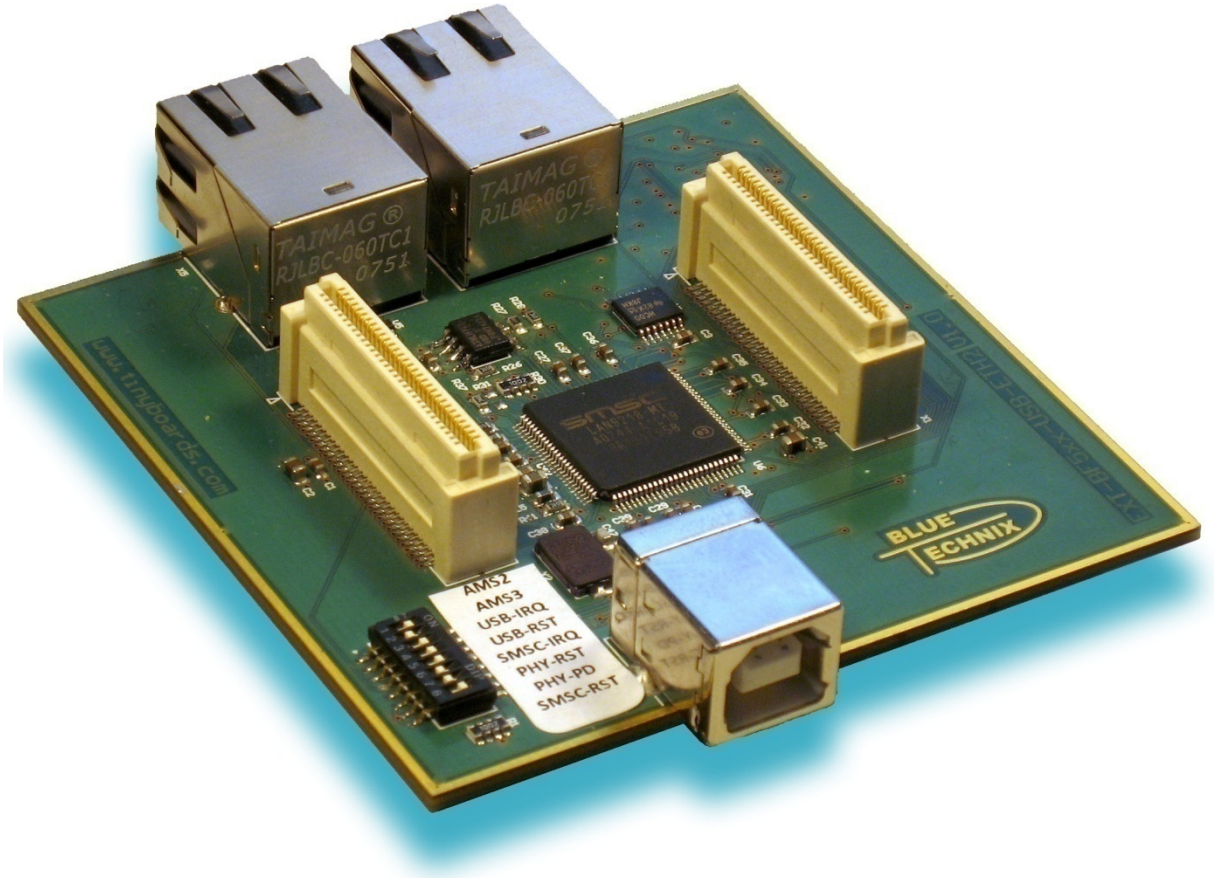
Hardware User Manual



EXT-BF5xx-USB-ETH2

V1.x

Tinyboards from Bluetechnix

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BLACKFIN Products

Core Modules:

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-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-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 (will be replaced by CM-BF527).
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.
CM-BF561:	Blackfin Processor Module powered by Analog Devices dual core ADSP-BF561 processor; up to 2x 600MHz, 64MB RAM, 8MB Flash, 120 pin expansion connector and a size of 36.5x31.5mm.
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-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.

Development Boards:

EVAL-BF5xx:	Low cost Blackfin processor Evaluation Board with one socket for any Bluetechnix Blackfin Core Module. Additional peripherals are available, such as an SD-Card.
DEV-BF5xxDA-Lite:	Get ready to program and debug Bluetechnix Core Modules with this tiny development platform including a USB Based Debug Agent. The

DEV-BF5xxDA-Lite is a low cost starter development system including VDSP++ Evaluation Software License.

DEV-BF5xx-FPGA: Blackfin Development Board with two sockets for any combination of Blackfin Core Modules. Additional peripherals are available, such as SD-Card, Ethernet, USB host, multi-port JTAG including a USB based Debug Agent, connector for an LCD-TFT Display and connector for a digital camera system. A large on-board SPARTAN-3 FPGA and Soft IPs make this board the most flexible Blackfin development platforms ever developed.

DEV-BF548DA-Lite: Get ready to program and debug Bluetechnix CM-BF548 Core Module with this tiny development platform including a USB Based Debug Agent. The DEV-BF548DA-Lite is a low cost starter development system including VDSP++ Evaluation Software License.

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

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 the CM-BF537E, CM-BF537U and TCM-BF537 Core Modules is based upon the BLACKSheep VDK driver Framework.

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:

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-USB-ETH2 Board is an extender plug-on board for the EVAL-BF5xx (V4.x) Board, the DEV-BF5xxDA-Lite or the DEV-BF5xx-Lite. It provides Ethernet and USB 2.0 functionality for all Blackfin Core Modules.

Especially for the TCM-BF527 and TCM-BF537 there is an Ethernet Physical Transceiver on board, so that you can use two Ethernet Interfaces.

1.1 Overview

The following figure gives an overview of the main used components and the board interconnection.

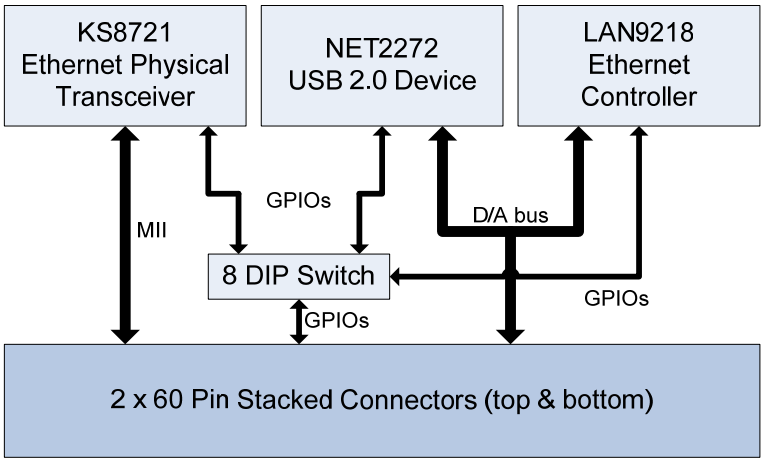


Figure 1-1: Overview of the EXT-BF5xx-USB-ETH2 Board

The EXT-BF5xx-USB-ETH2 Board features the following components:

KS8721 Ethernet physical chip

- 100BASE-TX/100BASE-FX/10BASE-T
- Fully compliant to IEEE 802.3u standard
- Auto negotiation as well as manual selection
- Half and Full Duplex mode
- On-chip built-in, analog front-end filtering for both 100BASE-T and 10BASE-T
- Only supported by TCM-BF537

For detail description refer to the manufacturer's homepage: http://micrel.com/

LAN9218

- Single Chip Ethernet Controller
- Optimized for highest performance

- Efficient architecture for low CPU overhead
- Easy external 32- or 16-bit bus interface
- Integrated 10/100 Ethernet PHY with HP Auto-MDIX
- Suports high definition (HD) MPEG2 streams

For detail description refer to the manufacturer's homepage: http://www.smsc.com/

NET2272 USB 2.0 device chip

- USB Specification r2.0
- USB full (12MBps) and high (480Mbps)
- Three Configurable Physical Endpoints, in addition to Endpoint 0
- 30 Configurable Virtual endpoints
- Configurable endpoints can be Isochronous, Bulk, or Interrupt, as well as IN or OUT
- High Bandwidth Isochronous Mode
- Maximum Packet Size up to 1 KB, double buffers
- Internal 3 KB Memory provides Transmit and Receive buffers
- 8- or 16-bit CPU or DMA bus transfers
- Automatic Retry of failed packets

For detail description refer to the manufacturer's homepage:
http://plxtech.com/products/net2000/

2 Specification

2.1 PCB Placement of connectors

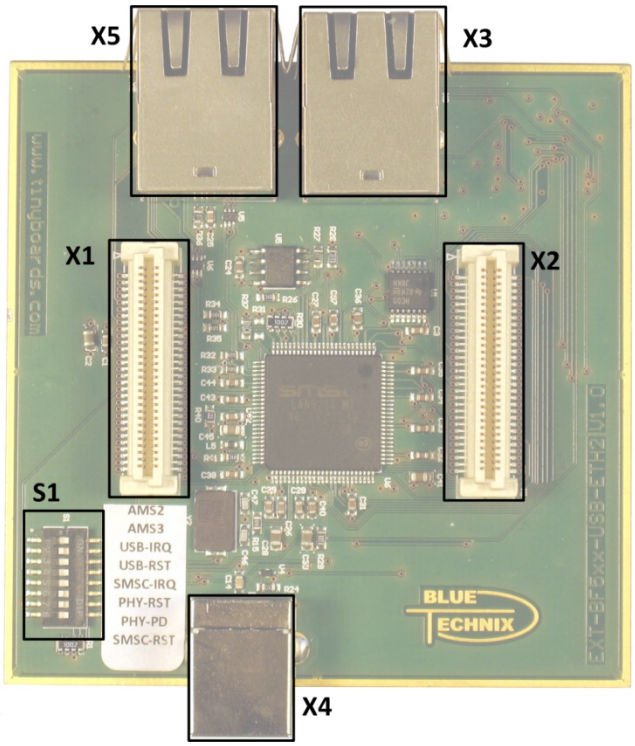


Figure 2-1: PCB Placement of connectors

2.1.1 X5

RJ45 Ethernet socket for the LAN9218

2.1.2 X3

RJ45 Ethernet socket for the KS8721

2.1.3 X4

USB 2.0 device plug for the Net2272 chip

2.1.4 X1, X2 Expansion Connectors

The Expansion Connectors have the same pin out as on the base board. They are directly routed through. Please refer to the appropriate base board for a pin description.

The connectors on the EXT-BF5xx-USB-ETH2 board for a Stacked Height of 16mm are of the following type:

Part	Manufacturer	Manufacturer Part Nr.
X1, X2	AMP (Stacked Height = 16mm)	5-5179010-2
Matching connector	AMP	5179031-2

Table 2-1: EXT-BF5xx- USB-ETH2 board connector types

These connectors can be ordered from Bluetechnix.

2.1.5 S1 DIP Switch

This switch allows to select each device and to disconnect the Blackfin GPIOs from the control signals, if the device won't be used.

Switch	BF Signal	Device Signal	Device	Description
1	$\overline{\text{AMS2}}$	$\overline{\text{AMS}}$	NET2272 / LAN6218	use $\overline{\text{AMS2}}$ for enabling devices
2	$\overline{\text{AMS3}}$	$\overline{\text{AMS}}$	NET2272 / LAN6218	use $\overline{\text{AMS3}}$ for enabling devices
3	GPIO[1)]	$\overline{\text{IRQ}}$	NET2272	set off if USB won't be used
4	GPIO[1)]	$\overline{\text{RESET}}$	NET2272	set off if USB won't be used
5	GPIO[1)]	$\overline{\text{IRQ}}$	LAN9218	set off if ETH2 won't be used
6	3.3V	$\overline{\text{RESET}}$	KS8721	set off if ETH1 won't be used
7	3.3V	$\overline{\text{PD}}$	KS8721	set off if ETH1 won't be used
8	3.3V	$\overline{\text{RESET}}$	LAN9218	set off if ETH2 won't be used

Table 2-2: DIP-Switch functionality

[1)] The Table 2-5 shows the GPIO assignment for all supported Core Modules.

2.2 Solder Jumper on DEV-BF5xxDA-lite (EVAL-BF5xx)

To use the KS8721 on the EXT-BF5xx-USB-ETH2 with a DEV-BF5xxDA-lite or EVAL-BF5xx you have to short JP4 and JP5. See DEV-BF5xxDA-lite (EVAL-BF5xx) manual for more details.

2.3 Base Addresses and GPIO Assignment

2.3.1 Memory Mapping

The following table shows the base address of the NET2272 and the LAN9218 depending on the position of the switches 1 and 2 on S1.

Positions that are not shown in the table (both ON, or both OFF) are not allowed!

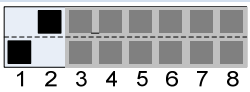
Switch Setting		NET2272	LAN9218
	$\overline{AMS2}$	0x2020'0000	0x2020'8000 *)
	$\overline{AMS3}$	0x2030'0000	0x2030'8000 *)

Table 2-3: Base addresses for all Core Modules except CM-BF561

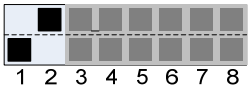
Switch Setting		NET2272	LAN9218
	$\overline{AMS2}$	0x2800'0000	0x2800'8000 *)
	$\overline{AMS1}$	0x2400'0000	0x2400'8000 *)

Table 2-4: Base Addresses for the CM-BF561

*) Memory mapping for V1.0.1 0x2**8'0000

2.3.2 GPIO Assignment

The table below shows which GPIO is connected to the NET2272 (USB) and the LAN9218 (ETH2) depending on the core module inserted on the base board.

Switch N°	Signal Description	(T)CM-BF527	(T)CM-BF537	CM-BF533	CM-BF548	CM-BF561
3	USB-IRQ	PF13	PG 13	PF 6	PD13	PF 45
4	USB-RESET 1)	PF14	PG 14	PF 5	n.a.	PF 46
5	ETH2-IRQ	PF11	PG 11	PF 8	PD11	PF 43

Table 2-5: GPIO assignment for the supported Core Modules

1) Note that the NET2272 USB Controller shares the reset line with the S6 push-button located on the Dev-Boards. Don't use this button together with the USB device controller!

2.4 Mechanical Outline

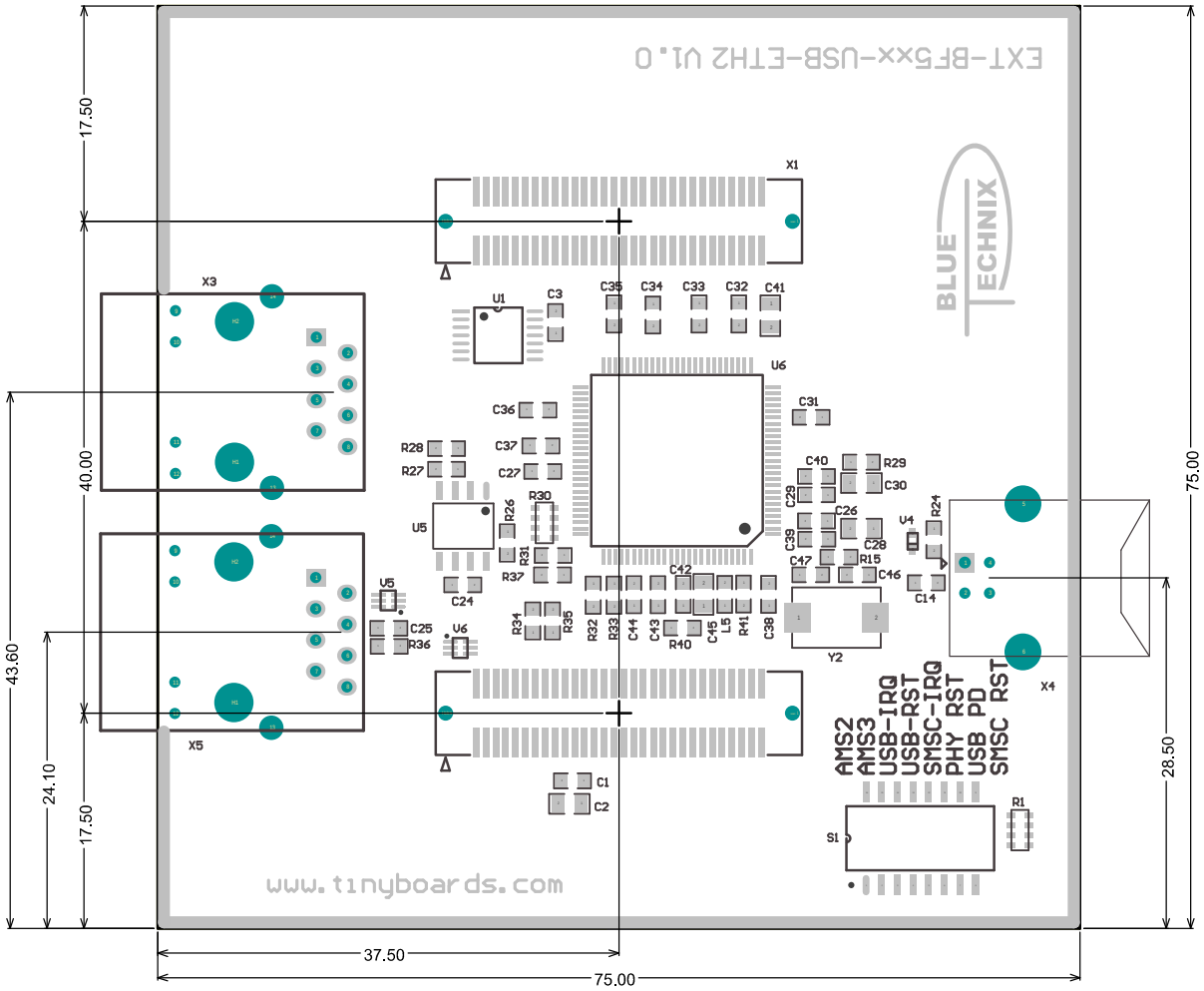


Figure 2-2: Mechanical Outline – Expansion Connector Placement

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

uClinux comes with device drivers necessary for this board. Please visit http://blackfin.uclinux.org/gf/project/bluetechnix/ for more information.

4 Anomalies

For the latest information regarding anomalies for this product, please consult the product home page:

http://www.bluetechnix.com/goto/ext-bf5xx-usb-eth2

Version	Name	Description
V1.0	Wrong DIP-Switch caption	The caption for the DIP switch S1 is wrong. A label with the correct caption will be added. If the added Label is missing, see the description in this manual (2.4).
V1.0	A19	A19 not available on CM-BF561; USB and SMSC9218 not working on CM-BF561

5 Product Changes

Version	Changes
1.0.1	First release
1.0.2	CS for the SMSC9218 changed from A19 to A15. Memory mapping changed from 0x2**8'0000 to 0x2**0'8000

Table 5-1: Product Changes

6 Document Revision History

Version	Date	Document Revision
3	2009-08-17	Anomaly list updated, Memory map updated
2	2009-06-10	Wrong interrupt flag for CM-BF561 Note for unusable S6 with NET2272
1	2009-04-20	First release

Table 6-1: Document Revision History

7 Abbreviations

n.c. not connected

n.s. not supported

A List of Figures and Tables

Figures

Tables