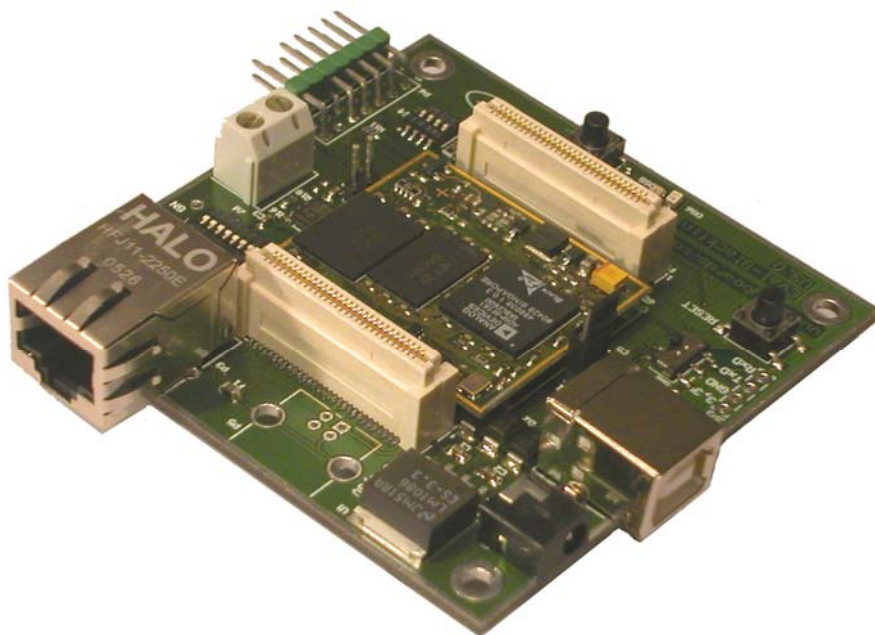


Hardware User Manual



EVAL-BF5xx Board V3.1 (V3.0)

PRELIMINARY

www.tinyboards.com

Maximum Power at Minimum Size

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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 EVAL-BF5xx Board is a low cost and lightweight evaluation platform for Bluetechnix Core Modules CM-BF533, CM-BF561, CM-BF534U, CM-BF537E, CM-BF537U and the upcoming TCM series of core modules. The small baseboard has all hardware necessary to test the performance of the core modules including a high-speed serial port directly connectable to a computers USB port, a digital video camera interface and a SD-Card mass storage device socket.

1.1 Overview

The EVAL-BF5xx Board includes the following components:

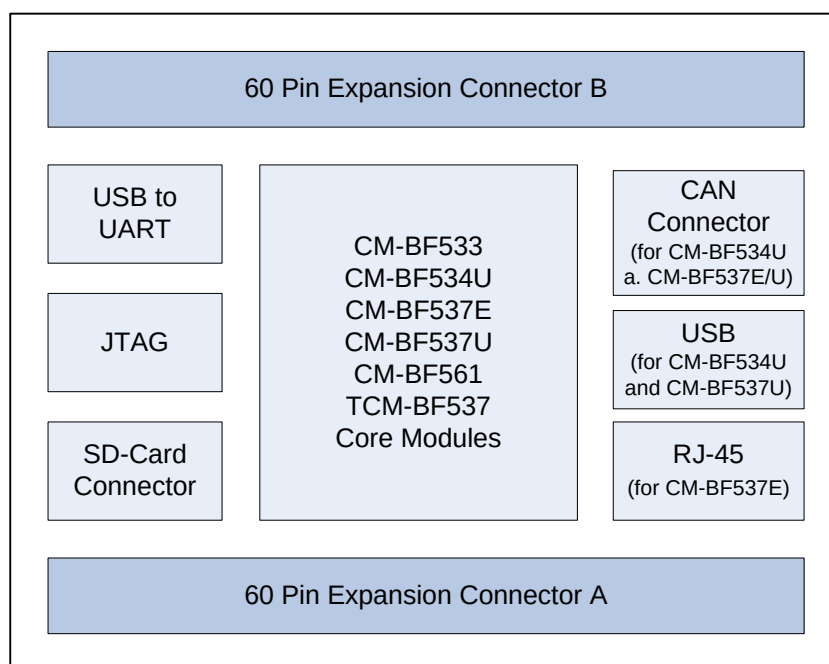


Figure 1-1: Overview of the EVAL-BF5xx Board

- **1 Core Module Slot**
 - Supports all current Bluetechnix Blackfin based Core Modules
- **USB**
 - Supports up to 915kbps UART-USB conversion.
 - Emulates a standard COM port on the computer.
- **JTAG**
 - JTAG-Plug that supports all analog Devices JTAG Emulators.

- **Expansion Connector 1**

- o SPORT 0
- o JTAG
- o UART
- o SPI
- o PPI-1 (Parallel Port Interface 1)
- o PFs (Programmable Flags)

- **Expansion Connector 2**

- o Data Bus
- o Address Bus
- o Memory Control Signals
- o PPI-2¹ (Parallel Port Interface 2)
- o Power Supply

- **2nd USB Connector (optional)**

- o Can only be used together with the CM-BF534U and CM-BF537U Core Module which has an on-board NETPLX 2272 USB2.0 Device Chip

- **RJ-45 Ethernet Plug**

- o Only in combination with the CM-BF537E module
- o Standard 10BASET/100BASET Ethernet connection

¹ Only available when using the CM-BF561 Core Module

2 Functional Specification

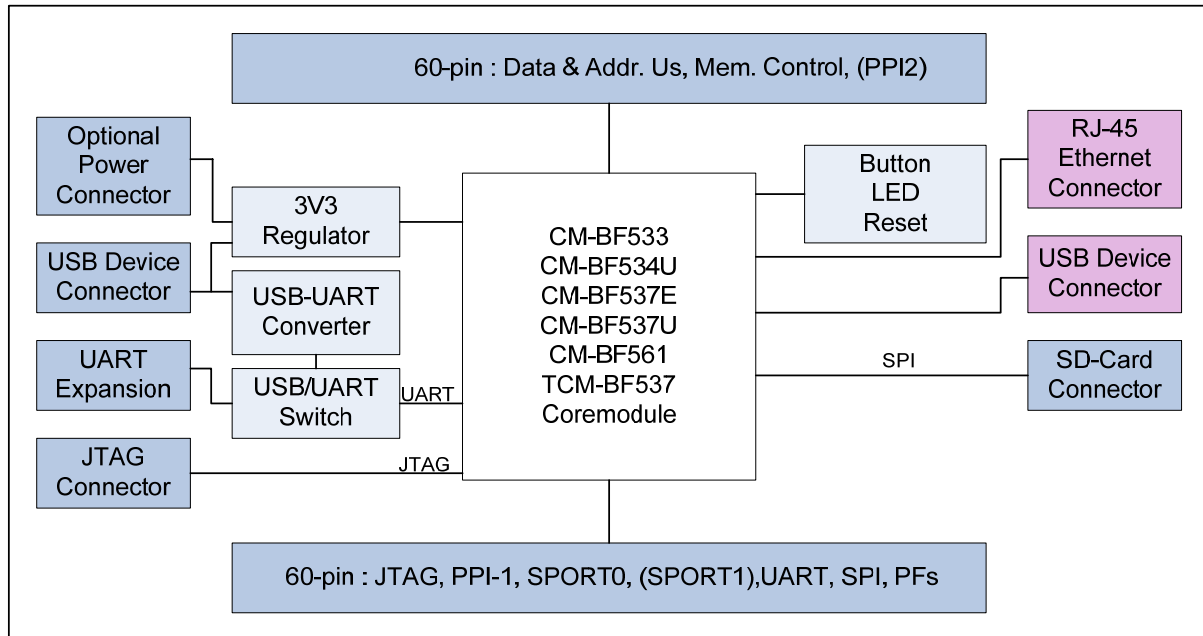


Figure 2-1: Detailed Block Diagram

Figure 2-1 shows a detailed block diagram of the EVAL-BF5xx Board.

For powering the board the *Power connector* or the *USB Device connector* can be used. Please note that your USB Device connector may not be sufficient for powering all Core Modules or any Extension Board.

The serial port of the Core Module can be routed directly to the *USB Port* (USB/UART Switch Position A towards the board edge) or to the *UART Expansion Pads* (USB/UART Switch Position B towards the Core Module).

The two *60-pin expansion connectors* bring all pins of the Core Module (Pin assignment in Section 2.2.3 and 2.2.4) directly to the expansion slot.

An *SD-Card connector* mounted at the bottom of the board allows making use of file IO Functions delivered with the BLACKSheep Software. BLACKSheep supports SD-Cards and includes a FAT files systems as well as the most relevant File IO Functions (depending on the Software Version).

The 2nd USB Device connector (colored in purple) can only be used with the CM-BF534U or the CM-BF537U Core Module which has an on-board USB V2.0 Device (NET2272 by PLX-technology).

The RJ-45 Ethernet connector (colored in purple) can only be used in combination with the CM-BF537E Core Module.

3 PCB Placement and Mechanical Outline

3.1 PCB Placement

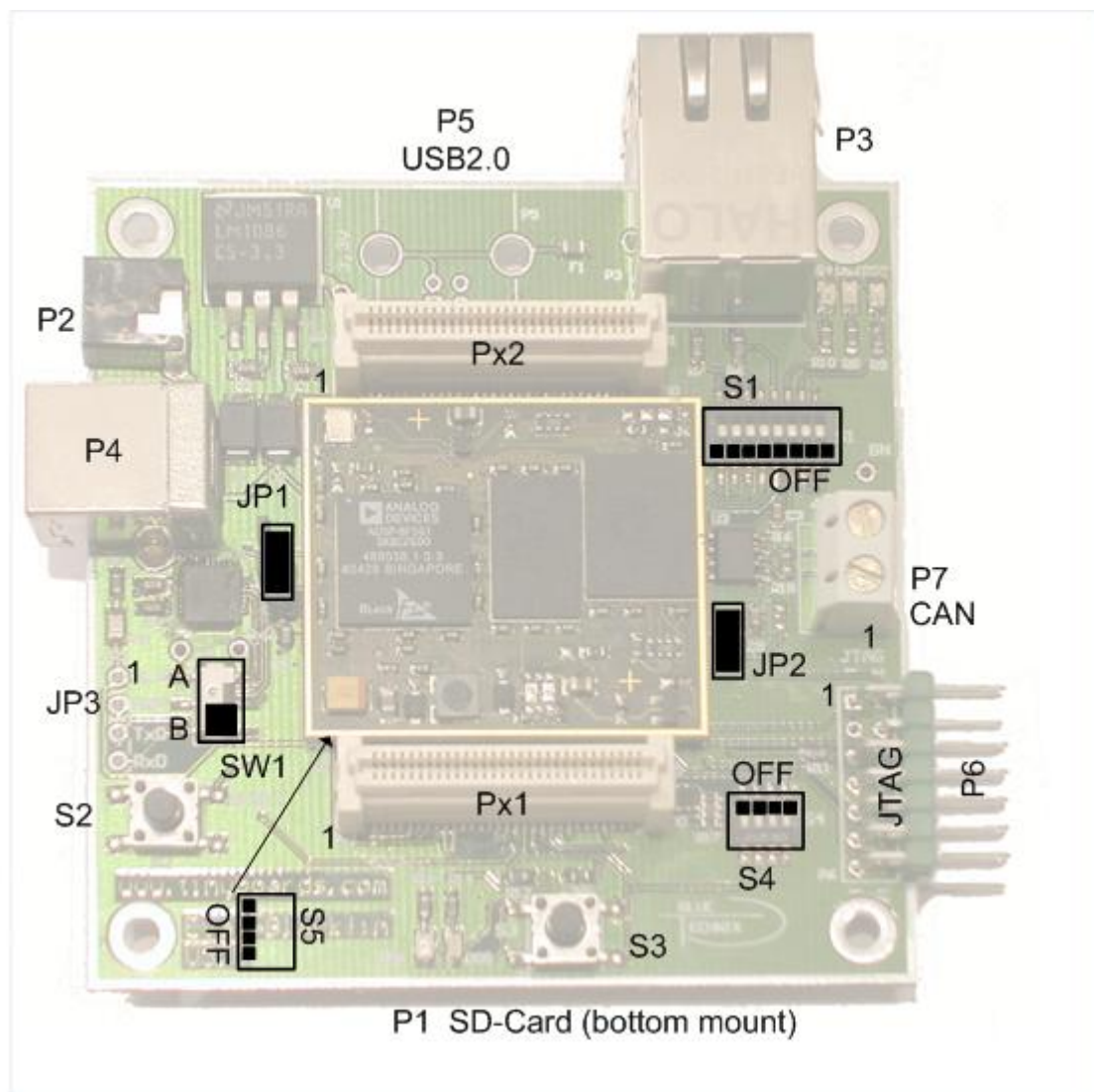


Figure 3-1: Connector PCB Placement

3.2 Mechanical Outline

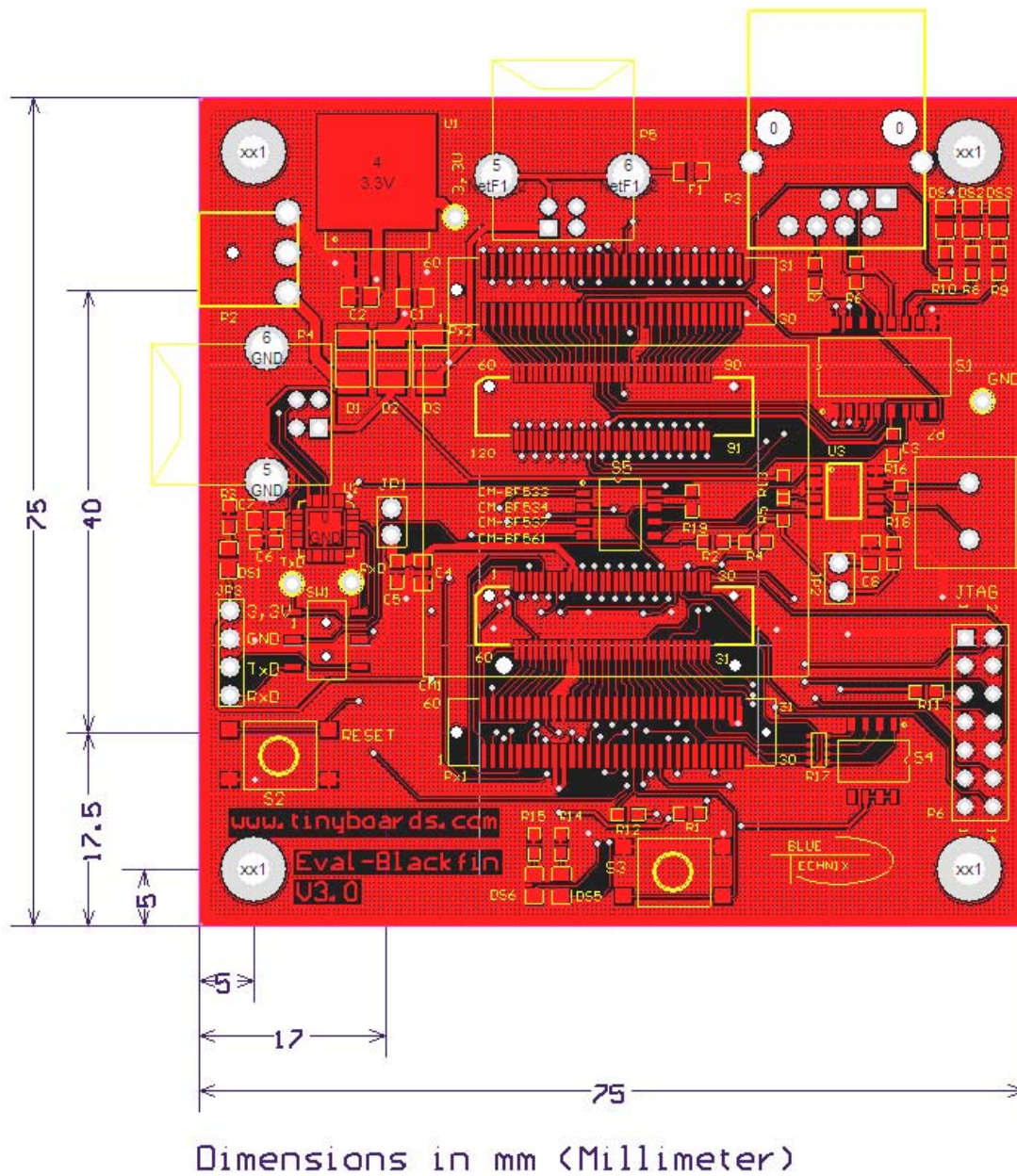


Figure 3-2: Mechanical Outline – Expansion Connector Placement

4 Connector Description

In the following the connectors shown in section 3.1 are described.

4.1 P1 –SD-Card Connector

Pin No.	Signal (Core Module)	Description (SD Card)
0	-	DAT2
1	NCS	CD/DAT3
2	MOSI	CMD
3	GND	VSS1
4	3,3V	VDD
5	SPICLK	CLK
6	GND	VSS2
7	MISO	DAT0
8	-	DAT1
9	PP11	CD
10	WP	WP
11	-	-
12	GND	GND
13	GND	GND

Table 4-1: SD-Card Connector

4.2 P2 – Power Connector

As a second power supply option, or if the 500mA provided by USB are not sufficient, P2 can be used as the main or as the secondary power connector. Both connectors P1 and P2 can be plugged into the evaluation board at the same time.

Pin No.	Signal	Description
1	GND	
2	NC	
3	Vin (+4V to +7V) Input Supply	Preferable 5V

Table 4-2: Power Supply

4.3 P4 – USB Connectors

P4 is a standard USB-B Device Connectors. From P4 the board may draw its power of up to 500mA at most. Without extension board this is enough power to run a CM-BF533 board @ 600MHz including a SD-Card. Anyway, this is not guaranteed for any Bluetechnix Blackfin Core Module.

4.4 P3 –RJ45 Ethernet Connector

Pin No.	Signal (Core Module)	Description
1	TX+	O
2	TX-	O
3	RX+	I
4	VA2.5V	PWR
5	NC	NC
6	RX-	I
7	-	-
8	GND	PWR

Table 4-3: Ethernet Connector

4.5 P5 – USB Connector

P5 is a standard USB-B Device Connectors. The USB connector is used for the CM-BF537U.

4.6 P6 – JTAG Connector

The JTAG connector is compliant to any Blackfin JTAG Emulator from Analog Devices.

4.7 P7 – CAN Connector

Pin No.	Signal (Core Module)	Signal Type
1	CAN-	I/O
2	CAN+	I/O

Table 4-4: CAN Connector

4.8 Expansion Connector Types

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

Part	Manufacturer	Manufacturer Part Nr.
Px1, Px2	AMP (Stacked Height = 16mm)	5-5179010-2
Matching connector	AMP	5179031-2

Table 4-5: DEV-board connector types

The matching connector, which is used for building an extender board, can be ordered from Bluetechnix.

4.9 Px1 – Expansion Connector 1

Pin 31 and 32 of the Px1 are Vin of P2. This is the input voltage of the connector P2 (see section 4.2).

Pin 29 and 30 of the Px1 are VLDO. This is the voltage of the onboard LDO (Vin – Vdiode). Details are found in the schematics of the EVAL boards.

CM-BF533 (inserted):

PIN No	Signal	Signal type	Pin No	Signal	Signal type
1	RSCLK0	I/O	2	DR0PRI	I
3	TSCLK0	I/O	4	DT0PRI	O
5	RSCLK1	I/O	6	DR1PRI	I
7	TSCLK1	I/O	8	DT1PRI	O
9	3V3	PWR	10	3V3	PWR
11	PPI0	I/O	12	PPI2	I/O
13	PF15 / PPI4	I/O	14	PF13 / PPI6	I/O
15	PF11 / PPI8	I/O	16	PF9 / PPI10	I/O
17	PF7/SPISEL7/PPI12	I/O	18	PF5/SPISEL5/PPI14	I/O
19	PF3/SPISEL3/PPI_FS3	I/O	20	TMR1 / PPI_FS1	I/O
21	TMR0	I/O	22	PF1 / SPISEL1	I/O
23	RX	I	24	MOSI	I/O
25	SCK	I	26	BMODE0	I
27	GND	PWR	28	n.c.	-
29	VLDO	-	30	VLDO.	-
31	Vin of P2	PWR	32	Vin of P2	PWR
33	n.c.	-	34	n.c.	-
35	n.c.	-	36	BMODE1	I
37	MISO	I/O	38	TX	O
39	PF0 / nSPISS	I/O	40	PF2 / SPISEL2	I/O
41	PPI_CLK	I/O	42	TMR2 / PPI_FS2	I/O
43	PF4/SPISEL4/PPI15	I/O	44	PF6/SPISEL6/PPI13	I/O
45	PF8 / PPI11	I/O	46	PF10 / PPI9	I/O
47	PF12 / PPI7	I/O	48	PF14 / PPI5	I/O
49	PPI3	I/O	50	PPI1	I/O
51	GND	PWR	52	GND	PWR
53	DT1SEC	O	54	TFS1	I/O
55	DR1SEC	I	56	RFS1	I/O
57	DT0SEC	O	58	TFS0	I/O
59	DR0SEC	I	60	RFS0	I/O

Table 4-6: Connector Px1 pin assignment for CM-BF533

CM-BF537E (inserted):

Pin No	Signal	Signal type	Pin No	Signal	Signal type
1	RSCLK0/TACLK2	I/O	2	DR0PRI/ TACLK4	I
3	TSCLK0/TACLK1	I/O	4	DT0PRI/SPI_CS2	O
5	CLK_out	O	6	SDA	I/O
7	PF4/TMR5/SPI_CS6	I/O	8	PF5/TMR4/SPI_CS5	I/O
9	3V3	PWR	10	3V3	PWR
11	PG0/PPI1D0	I/O	12	PG2/PPI1D2	I/O
13	PG4/PPI1D4	I/O	14	PG6/PPI1D6	I/O
15	PG8/PPI1D8/DR1SEC	I/O	16	PG10/PPI1D10/RSCLK1	I/O
17	PG12/PPI1D12/RE1PRI	I/O	18	PG14/PPI1D14/TFS1	I/O
19	PPI1SY3/PF7/TMR2	I/O	20	PPI1SY1/PF8/TMR0	I/O
21	PPI1SY1/PF8/TMR0	I/O	22	PF3/Tx1/TMR6/TACI6	I/O
23	PF1/DMAR1/TACI1/Rx0	I/O	24	PF11/MOSI	I/O
25	PF13/SCK	I/O	26	BMODE0	I
27	GND	PWR	28	n.c.	-
29	VLDO	-	30	VLDO	-
31	Vin of P2	PWR	32	Vin of P2	PWR
33	n.c.	-	34	BMODE2	I
35	n.c.	-	36	BMODE1	I
37	PF12/MISO	I/O	38	PF0/DMAR0/Tx0	O
39	PF14/SPI_SS	I/O	40	PF2/Rx1/TMR7	I/O
41	PPI1Clk/PF15/TMRCLK	I/O	42	PPI1Sy2/PF8/TMR1	I/O
43	PG15/PPI1D15/DT1PRI	I/O	44	PG13/PPI1D13/TSCLK1	I/O
45	PG11/PPI1D11/RFS1	I/O	46	PG9/PPI1D9/TD1SEC	I/O
47	PG7/PPI1D7	I/O	48	PG5/PPI1D5	I/O
49	PG3/PPI1D3	I/O	50	PG1/PPI1D1	I/O
51	GND	PWR	52	GND	PWR
53	PF5/TMR4/SPI_CS5	O	54	PF6/TMR3/SPI_CS4	I/O
55	PF10/SPI_SC1	I	56	SCL	I/O
57	DT0SEC/CANTX/SPICS7	O	58	TFS0	I/O
59	DR0SEC/TACIO/CANRX	I	60	RFS0/TACLK3	I/O

Table 4-7: Connector Px1 pin assignment for CM-BF537

TCM-BF537 (inserted)

Pin No.	Signal	Signal type	Pin No.	Signal	Signal type
1	RSCLK0/TACLK2	I/O	2	DR0PRI/ TACLK4	I
3	TSCLK0/TACLK1	I/O	4	DT0PRI/SPI_SSEL2	O
5	PH15 / MIICRS	I/O	6	SDA	I/O
7	PH7 / COL	I/O	8	PH6/MIIPHYINT	I/O
9	Vin 3V3	PWR	10	Vin 3V3	PWR
11	PG0/PPI1D0	I/O	12	PG2/PPI1D2	I/O
13	PG4/PPI1D4	I/O	14	PG6/PPI1D6	I/O
15	PG8/PPI1D8/DR1SEC	I/O	16	PG10/PPI1D10/RSCLK1	I/O

17	PG12/PPI1D12/RE1PRI	I/O	18	PG14/PPI1D14/TFS1	I/O
19	PPI1SY3/PF7/TMR2	I/O	20	PPI1SY1/PF8/TMR0	I/O
21	MDC	I/O	22	PF3/Rx1/TMR6/TACI6	I/O
23	PF1/DMAR1/TACI1/Rx0	I/O	24	PF11/SPI_MOSI	I/O
25	PF13/SPI_SCK	I/O	26	BMODE0	I
27	GND	PWR	28	n.c	-
29	VLDO	-	30	VLDO	-
31	Vin of P2	-	32	Vin of P2	-
33	n.c.	-	34	BMODE2	-
35	MDIO	-	36	BMODE1	I
37	PF12/SPI_MISO	I/O	38	PF0/DMAR0/Tx0	I/O
39	PF14/SPI_SS	I/O	40	PF2/Tx1/TMR7	I/O
41	PPI1Clk/PF15/TMRCLK	I/O	42	PPI1Sy2/PF8/TMR1	I/O
43	PG15/PPI1D15/DT1PRI	I/O	44	PG13/PPI1D13/TSCLK1	I/O
45	PG11/PPI1D11/RFS1	I/O	46	PG9/PPI1D9/TD1SEC	I/O
47	PG7/PPI1D7	I/O	48	PG5/PPI1D5	I/O
49	PG3/PPI1D3	I/O	50	PG1/PPI1D1	I/O
51	GND	PWR	52	GND	PWR
53	PH5/MIITxCLK	I/O	54	PF6/TMR3/SPI_SSEL4	I/O
55	PF10/SPI_SSEL1	I	56	SCL	I/O
57	DT0SEC/CANTX/SPI_SS EL7	O	58	TFS0	I/O
59	DR0SEC/TACIO/CANRX	I	60	RFS0/TACLK3	I/O

Table 4-8: Connector Px1 pin assignment for TCM-BF537

CM-BF561 (inserted):

Pin No	Signal	Signal type	Pin No	Signal	Signal type
1	RSCLK0 / PF28	I/O	2	DR0PRI	I
3	TSCLK0 / PF29	I/O	4	DT0PRI / PF18	I/O
5	PF11(Clk_out optional)	I/O	6	PF9	I/O
7	PF7/SPISEL7/TMR7	I/O	8	PF5/SPISEL5/TMR5	I/O
9	3V3	PWR	10	3V3	PWR
11	PPI1D0	I/O	12	PPI1D2	I/O
13	PPI1D4	I/O	14	PPI1D6	I/O
15	PPI1D8 / PF40	I/O	16	PPI1D10 / PF42	I/O
17	PPI1D12 / PF44	I/O	18	PPI1D14 / PF46	I/O
19	PPI1SYNC3	I/O	20	PPI1SYNC1 / TMR8	I/O
21	PF3 / SPICS2	I/O	22	PF1/SPISEL1/TMR1	I/O
23	RX / PF27	I/O	24	MOSI	I/O
25	SCK	I/O	26	nABE2	O
27	ARDY	I	28	n.c.	-
29	VLDO	-	30	VLDO	-
31	Vin of P2	PWR	32	Vin of P2	PWR
33	n.c.	-	34	nAMS3	O
35	nABE1	O	36	nABE0	O
37	MISO	I/O	38	TX / PF26	I/O

39	PF0/SPISS/TMR0	I/O	40	PF2/SPISEL2/TMR2	I/O
41	PPI1CLK	I	42	PPI1SYNC2 / TMR9	I/O
43	PPI1D15 / PF47	I/O	44	PPI1D13 / PF45	I/O
45	PPI1D11 / PF43	I/O	46	PPI1D9 / PF41	I/O
47	PPI1D7	I/O	48	PPI1D5	I/O
49	PPI1D3	I/O	50	PPI1D1	I/O
51	GND	PWR	52	GND	PWR
53	PF4/SPISEL4/TMR4	I/O	54	PF6/SPISEL6/TMR6	I/O
55	PF8	I/O	56	PF10	I/O
57	DT0SEC / PF17	O	58	TFS0 / PF16	I/O
59	DR0SEC / PF20	I	60	RFS0 / PF19	I/O

Table 4-9: Connector Px1 pin assignment for CM-BF561

4.10 Px2 – Expansion Connector 2

CM-BF533 (inserted):

Pin No	Signal	Signal type	Pin No	Signal	Signal type
1	A1	O	2	A3	O
3	A5	O	4	A7	O
5	A9	O	6	A11	O
7	A13	O	8	A15	O
9	A17	O	10	A19	O
11	ABE1	O	12	n.c.	-
13	n.c.	-	14	n.c.	-
15	1V8	O	16	ADRY	I
17	n/BG	O	18	CLK_Out 25MHz	O
19	GND	PWR	20	nAMS3	O
21	nAWE	O	22	NMI	I
23	D0	I/O	24	D2	I/O
25	D4	I/O	26	D6	I/O
27	D8	I/O	28	D10	I/O
29	D12	I/O	30	D14	I/O
31	D15	I/O	32	D13	I/O
33	D11	I/O	34	D9	I/O
35	D7	I/O	36	D5	I/O
37	D3	I/O	38	D1	I/O
39	nRESET	I	40	nAOE	O
41	nARE	O	42	nAMS2	O
43	VDD-RTC	PWR	44	nBGH (at Slot B via R205)	O
45	nBR	I	46	n.c.	-
47	n.c.	-	48	n.c.	-
49	n.c.	-	50	n.c.	-
51	ABE0	O	52	A18	O
53	A16	O	54	A14	O

55	A12	O	56	A10	O
57	A8	O	58	A6	O
59	A4	O	60	A2	O

Table 4-10: Connector Px2 pin assignment for CM-BF533

CM-BF537E (inserted):

Pin No	Signal	Signal type	Pin No	Signal	Signal type
1	A1	O	2	A3	O
3	A5	O	4	A7	O
5	A9	O	6	A11	O
7	A13	O	8	A15	O
9	A17	O	10	A19	O
11	nABE1	O	12	LED_ACT	O
13	GND	-	14	RX+	I
15	RX-	I	16	ADRY	I
17	nBG	O	18	CLK_out	O
19	GND	PWR	20	nAMS3	O
21	nAWE	O	22	NMI	I
23	D0	I/O	24	D2	I/O
25	D4	I/O	26	D6	I/O
27	D8	I/O	28	D10	I/O
29	D12	I/O	30	D14	I/O
31	D15	I/O	32	D13	I/O
33	D11	I/O	34	D9	I/O
35	D7	I/O	36	D5	I/O
37	D3	I/O	38	D1	I/O
39	nReset	I	40	nAOE	O
41	nARE	O	42	nAMS2	O
43	VDD-RTC	PWR	44	nBGH (at Slot B via R205)	O
45	nBR	I	46	VA25	PWR
47	TX-	O	48	TX+	O
49	LED_FD	O	50	LED_SPEED	O
51	nABE0	O	52	A18	O
53	A16	O	54	A14	O
55	A12	O	56	A10	O
57	A8	O	58	A6	O
59	A4	O	60	A2	O

Table 4-11: Connector Px2 pin assignment for CM-BF537E

TCM-BF537 (inserted)

Pin No.	Signal	Signal type	Pin No.	Signal	Signal type
1	A1	O	2	A3	O

3	A5	O	4	A7	O
5	A9	O	6	A11	O
7	A13	O	8	A15	O
9	A17	O	10	A19	O
11	nABE1 / SDQM1	O	12	PH1/ETxD1	I/O
13	PH3/ETxD3	I/O	14	PH8/ERxD0	I/O
15	PH10/ERxD2	I/O	16	ADRY	I
17	PH13/ERxCLK	I/O	18	CLKBUF	O
19	GND	PWR	20	nAMS3	O
21	nAWE	O	22	CLKOUT (SCLK)	I
23	D0	I/O	24	D2	I/O
25	D4	I/O	26	D6	I/O
27	D8	I/O	28	D10	I/O
29	D12	I/O	30	D14	I/O
31	D15	I/O	32	D13	I/O
33	D11	I/O	34	D9	I/O
35	D7	I/O	36	D5	I/O
37	D3	I/O	38	D1	I/O
39	nReset	I	40	nAOE	O
41	nARE	O	42	nAMS2	O
43	VDD-RTC	PWR	44	PH14/ERXER (at Slot B via R205)	I/O
45	PH12/ERxDV	I/O	46	PH11/ERxD3	PWR
47	PH9/ERxD1	I/O	48	PH4/ETxEN	I/O
49	PH2/ETxD2	I/O	50	PH0/ETxD0	I/O
51	nABE0 / SDQM0	O	52	A18	O
53	A16	O	54	A14	O
55	A12	O	56	A10	O
57	A8	O	58	A6	O
59	A4	O	60	A2	O

Table 4-12: Connector Px2 pin assignment for TCM-BF537

CM-BF561 (inserted):

Pin No	Signal	Signal type	Pin No	Signal	Signal type
1	nABE3	O	2	A3	O
3	A5	O	4	A7	O
5	A9	O	6	A11	O
7	A13	O	8	A15	O
9	PPI2SYNC1	I/O	10	PPI2SYNC2	I/O
11	PPI2D1	I/O	12	PPI2D3	I/O
13	PPI2D5	I/O	14	PPI2D7	I/O
15	PPI2D9 / PF33	I/O	16	PPI2D11 / PF35	I/O
17	PPI2D13 / PF37	I/O	18	PPI2D15 / PF39	I/O
19	GND	PWR	20	nAMST	O
21	nAWE	O	22	NMI0	I
23	D0	I/O	24	D2	I/O

25	D4	I/O	26	D6	I/O
27	D8	I/O	28	D10	I/O
29	D12	I/O	30	D14	I/O
31	D15	I/O	32	D13	I/O
33	D11	I/O	34	D9	I/O
35	D7	I/O	36	D5	I/O
37	D3	I/O	38	D1	I/O
39	nRESET	I	40	nAOE	O
41	nARE	O	42	nAMS2	O
43	n.c.	-	44	PPI2D14 / PF38 (at Slot B via R205)	I/O
45	PPI2D12 / PF36	I/O	46	PPI2D10 / PF34	I/O
47	PPI2D8 / PF32	I/O	48	PPI2D6	I/O
49	PPI2D4	I/O	50	PPI2D2	I/O
51	PPI2D0	I/O	52	PPI2SYNC3	I/O
53	PPI2CLK	I	54	A14	O
55	A12	O	56	A10	O
57	A8	O	58	A6	O
59	A4	O	60	A2	O

Table 4-13: Connector Px2 pin assignment for CM-BF561

5 Switches, Jumper and LED Description

5.1 S1 Ethernet Switch for CM-BF537E

This 8 pin DIP switch enables the Ethernet connector. It is necessary for the Core Module CM-BF537E.

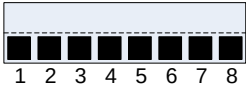
Switch Settings	Description
 1 2 3 4 5 6 7 8	CM-BF537E
 1 2 3 4 5 6 7 8	CM-BF533, CM-BF537U, TCM-BF537, CM-BF561

Table 5-1: Ethernet Switch

5.2 S5 Core Module Configuration

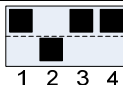
Switch Settings S5	Core Module inserted
CM-BF533 and CM-BF561	 1 2 3 4
CM-BF534U, CM-BF537E, CM-BF537U and TCM-BF537	 1 2 3 4

Table 5-2: Core Module Configuration

5.3 SW1 – UART Switch

Move Sw1 to POSITION A to route the Core Modules RX and TX signals to USB

Move Sw1 to Position B to route the Core Modules RX and TX signals to JP3

5.4 JP1 - Power Supply Jumper

This jumper can be removed in order to insert an AMPERE METER for current measurement of the entire Core Module.

5.5 JP2 - Power Supply Jumper for RTC

Enables power supply for RTC of the CM-BF53x.

5.6 JP3 – UART Solder Pads

Pin No.	Signal	Signal Type
1	RxD Blackfin	Input Core Module
2	TxD Blackfin	Output Core Module
3	GND	
4	3V3	Regulated Power

Table 5-3: UART Connector

5.7 Buttons

The Button S2 is the main Reset Button of the Core Module.
The Button S3 is a general-purpose input button.

5.8 LEDs

The LED DS2 indicates that the board is powered.
The LEDs DS1 and DS3 are connected to general-purpose IO pins.

Core Module	LED DS5	LED DS6	Button S3
CM-BF533	PF8	PF9	PF5
CM-BF537U	PG11	PG10	PG14
CM-BF537E	PG11	PG10	PG14
TCM-BF537	PG11	PG10	PG14
CM-BF561	PF43	PF42	PF46

Table 5-4: Core Module LEDs

Ethernet LEDs		
DS2	Yellow	Full duplex
DS3	Green	Activity
DS4	Green	100MB Speed LED

Table 5-5: Ethernet LEDs

6 Boot Mode Description

Boot-settings for CM-BF561 (S4)

If you are using a CM-BF561 set all switches of S4 OFF!



Due to the limited number of pins on the two connectors, the CM-BF561 can only set its boot mode on the core module itself by changing the resistor settings. See the CM-BF561 Manual for further details.

Boot-settings for CM-BF533 (S4)

Switch Settings BMODE0,BMODE1	Boot Mode	Description
	0	Execute from 16Bit ext. mem. Bypass ROM (Standard boot mode for uBoot)
	1	Boot from 8Bit or 16Bit EEPROM/Flash (Standard boot mode for BLACKSheep)
	2	Boot from SPI 8Bit
	3	Boot from SPI 16Bit

Table 6-1: Bootmode CM-BF533

Boot-settings for CM-BF537E, CM-BF537U and TCM-BF537 (S4)

Switch Settings BMODE0,BMODE1,BMODE2	Boot Mode	Description
	0	Execute from 16Bit ext. mem. Bypass ROM (Standard boot mode for uBoot)
	1	Boot from 8Bit or 16Bit EEPROM/Flash (Standard boot mode for BLACKSheep)
	2	Reserved
	3	Boot from serial SPI Memory
	4	Boot from SPI Host (slave mode)

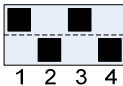
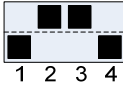
	5	Boot from serial TWI memory
	6	Boot from TWI host (slave mode)
	7	Boot from UART host (slave mode)

Table 6-2: Bootmode CM-BF534/537

7 Installation

The installation guide is written for Windows (Windows 2000 and WinXP). However for connecting the USB device the driver for MAC and LINUX are available on the CD.

In order to set up and test your EVAL-board the following steps can be done:

1. Make sure the Jumper JP1 is set and the Switch SW1 is in Position A as shown in the following picture:

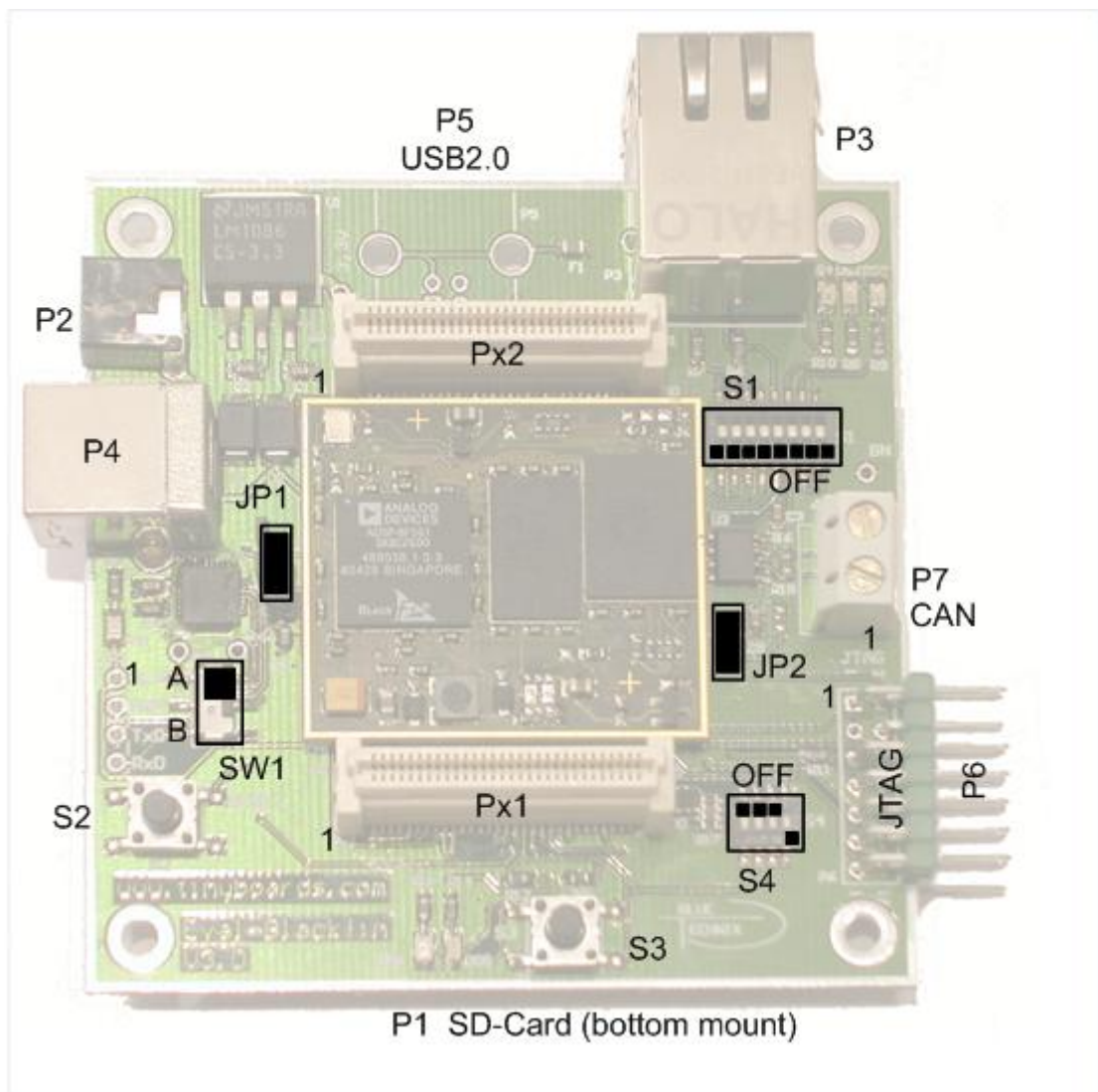


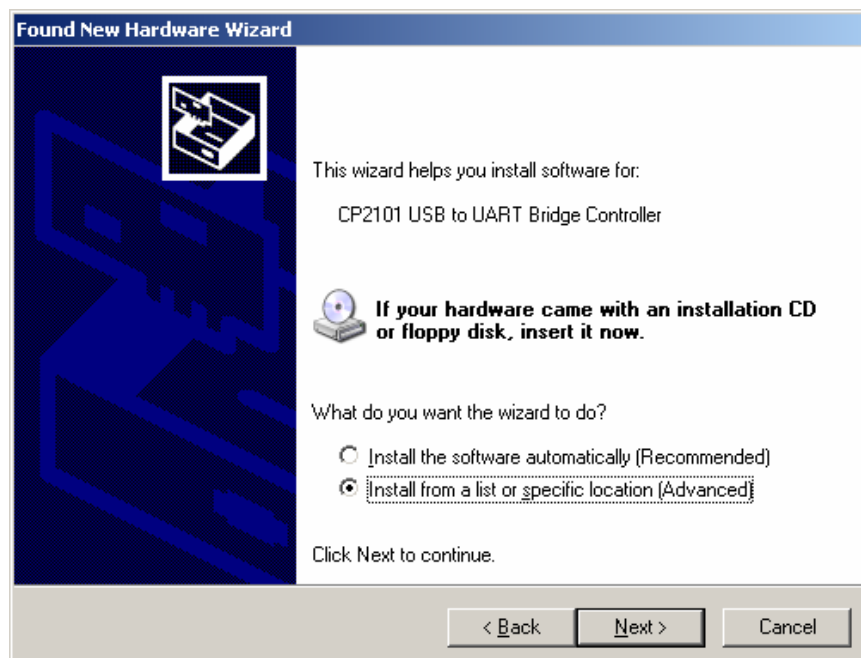
Figure 7-1: Overview of the EVAL-Board

2. If you want to use an SD-Card, insert the SD-Card in the appropriate slot at the bottom side of the board.

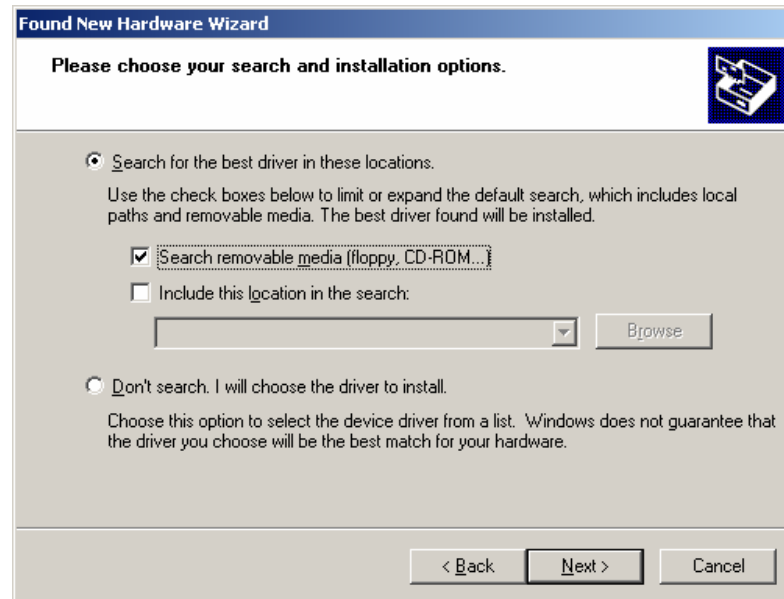
3. Connect the EvalBoard via USB to the PC. The pre-flashed BLACKSheep starts and the LED mounted on the EVAL board starts blinking. On the PC usually the 'Found New Hardware Wizard' opens.



If the wizard is asking you to look at the windows update site, select “No, not this time”

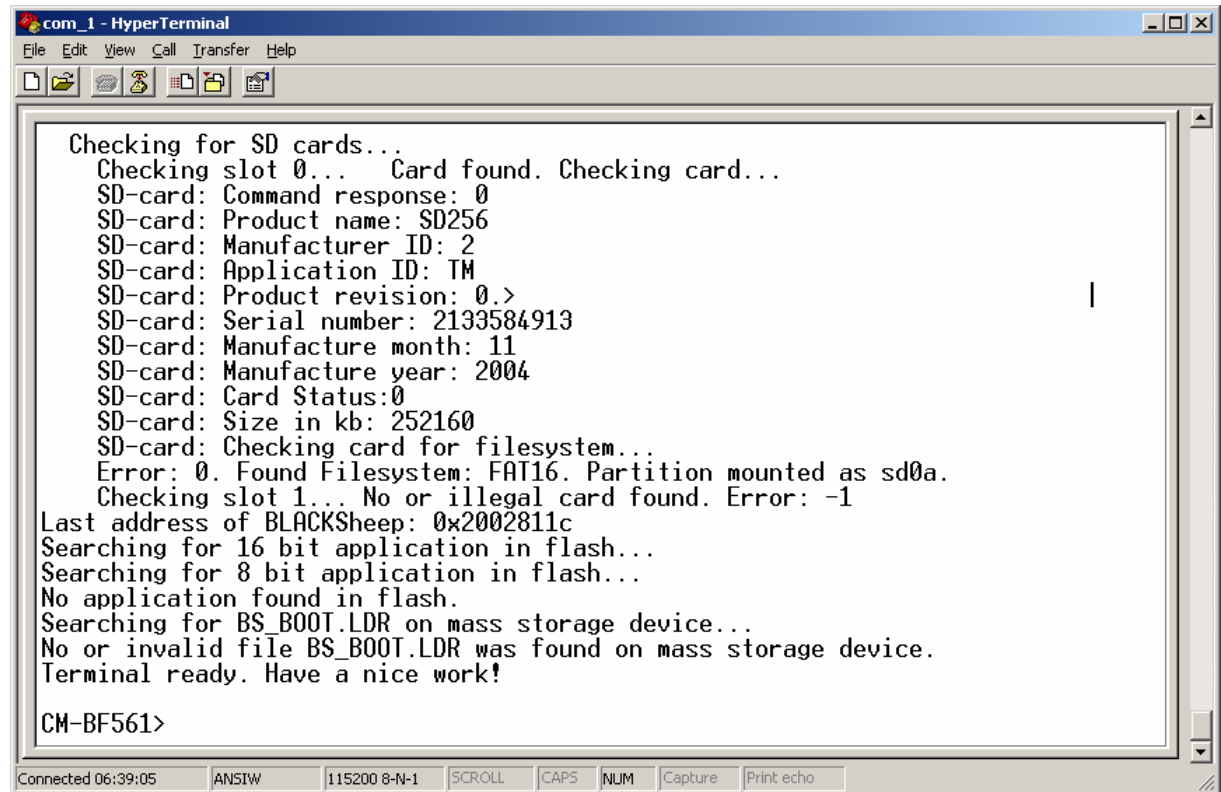


Choose: “Install from a list or specific location”. The driver is located on your support CD.



This procedure has to be done twice, because at first the USB driver will be installed. Then the Hardware Wizard opens again, because the UART bridge driver has to be installed in addition using the same driver file. Please do the same again as described in this point.

4. Open the Windows device manager (Control Panel → System → Hardware) to see which COM port number has been assigned to the CP2101 UART-to-USB Chip. This number differs from computer to computer based on the already installed COM ports. (e.g. COM4)
5. Open a Terminal program like the HyperTerminal included in Windows operating systems and open the respective COM port with **115200 Baud, 8 Data-bits, No Parity and 1 Stop bit, disable the Hardware flow control**.
6. Reset the Eval board (Press reset button S1). After this you will see the BLACKSheep boot-screen showing up. If you disconnect the device, you have to reconnect.



```
com_1 - HyperTerminal
File Edit View Call Transfer Help

Checking for SD cards...
Checking slot 0... Card found. Checking card...
SD-card: Command response: 0
SD-card: Product name: SD256
SD-card: Manufacturer ID: 2
SD-card: Application ID: TM
SD-card: Product revision: 0.>
SD-card: Serial number: 2133584913
SD-card: Manufacture month: 11
SD-card: Manufacture year: 2004
SD-card: Card Status:0
SD-card: Size in kb: 252160
SD-card: Checking card for filesystem...
Error: 0. Found Filesystem: FAT16. Partition mounted as sd0a.
Checking slot 1... No or illegal card found. Error: -1
Last address of BLACKSheep: 0x2002811c
Searching for 16 bit application in flash...
Searching for 8 bit application in flash...
No application found in flash.
Searching for BS_BOOT.LDR on mass storage device...
No or invalid file BS_BOOT.LDR was found on mass storage device.
Terminal ready. Have a nice work!

CM-BF561>
```

This shows a sample boot screen. Depending on the current software version, you might get different boot messages.

7. You can find a simple hello world program on your support CD or at the download section of the product homepage. To start the sample program, type "*xmr UART*" on your terminal program, then (Transfer → Send file) select the appropriate file "*UART.ldr*" depending on your Core Module, choose protocol "Xmodem" and send. After the download has finished type "*exec UART*" for executing the sample program.
8. Press reset to return to the BLACKSheep command line.

8 Using the VDSP Flash Programming Tool

8.1 Developing an Application

If you are developing your own projects with the VDSP++ development tools including the JTAG provided by Analog Devices you can use the flash programming tool included in the VDSP++ environment in order to flash your program on the core module. As flash driver you have to load the flash driver located on your EVAL board support CD (BF533EZFlasher.dxe).

8.2 Overriding BLACKSheep Code

If you overwrite intentionally or unintended the section in the flash containing the BLACKSheep code, you need a JTAG device and the VDSP++ flash tool to reprogram the flash. Flashing the file BLACKSheep53x.ldr located on the CD, reinstalls the BLACKSheep code.

9 Known Bugs

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10 Revision History

2006 12 30	USB Power Supply Update and Page Numbering
2006 10 02	Board Version changed to 3.1
2006 05 16	Ethernet Configuration
2006 03 03	Updated LED table
2006 02 28	Preliminary Version 3.0
2006 01 29	Update to Version 3.0
2005 12 19	Merging Getting Started with Hardware User Manual
2005 09 28	Release Version No. 2.0.1, board prepared for Ethernet and USB2.0
2005 02-08	Release Version No. 1.0
2004 12 20	Beta Version of the Document

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