BLUE TECHNIX

Hardware User Manual

CM-BF527 V2.x

...maximum performance at minimum space

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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.

Blackfin® Core Modules

TCM-BF518-C-C-Q25S32F2 (TCM-BF518)

The Tiny Core Module TCM-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.

ACM-BF525C-C-C-Q25S64F4N1024

The Core Module ACM-BF525C is optimized for audio applications and performance. It is based on the high performance ADSPBF525Cfrom Analog Devices. It addresses 64MByte SDRAM via its 16bit wide SDRAM bus, has an onboard NOR-flash of 4MByte and a NAND-flash with 1024MByte.

CM-BF527-C-C-Q50S32F8 (CM-BF527)

The Core Module CM-BF527 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-C-C-Q25S32F2 (CM-BF533)

The Core Module CM-BF533 is powered by Analog Devices' single core ADSP-BF533 processor; up to 600MHz, 32MB SDRAM, 2MB flash, 2x60 pin expansion connectors at a size of 36.5x31.5mm.

TCM-BF537-C-I-Q25S32F8 (TCM-BF537)

The Tiny Core Module TCM-BF537 is 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-BF537-C-C-Q25S32F4 (CM-BF537E)

The Core Module CM-BF537 is 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 at a size of 36.5x31.5mm.

CM-BF537-C-C-Q30S32F4-U (CM-BF537U)

The Core Module CM-BF537 is 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 at a size of 36.5x31.5mm.

CM-BF548-C-C-Q25S64F8 (CM-BF548)

The Core Module CM-BF548 is characterized by its numerous peripheral interfaces, its performance in combination with its high speed memory interface (DDR). Key features are 533MHz, 64MB DDR SD-RAM (266MHz), and 8MB flash.

CM-BF561-C-C-Q25S64F8 (CM-BF561)

The Core Module CM-BF561 is powered by Analog Devices' dual core ADSP-BF561 processor; up to 2x 600MHz, 64MB SDRAM, 8MB flash, 2x60 pin expansion connectors at a size of 36.5x31.5mm.

eCM-BF561-C-C-Q25S128F32 (eCM-BF561)

The Core Module CM-BF561 is 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.

Core Module naming information

The idea is to put more Core Module specific technical information into the product name. New Core Module names will have following technical information covered in their names.

- Product Family,
- CPU-Type,
- Connection-Type,
- Operating Temperature Range,
- Crystal Frequency [MHz],
- RAM [MB],
- Flash [MB],
- External Controllers
- Optional
    - o Special and/or
    - o Former name

That expands of course the name but allows the customer to get the most important Core Module specific information at the first sight. Have a look at the example below to get an idea of the new Core Module names.

Example CM-BF537-C-C-Q25S32F4 (CM-BF537E)

CM - BF537 - C - C - Q25 S32 F4 - - (CM-BF537E)

Product Family
CM = Core Module
SBC = Single Board Computer

CPU-Type
Equals the name of CPU

Connection-Type
A = BGA
B = Border pad
C = Connector
S = Special

Operating Temperature Range
A = Automotive   (-40° to +125°)
C = Commercial   (0° to +70°)
I = Industry   (-40° to +85°)

Crystal Frequency
Notation: QXX[MHz]

Former name

Special
Custom Core Modules or specials
uC = uclinux

Extra controllers mounted
E = Ethernet
U = USB

Flash [MB]
F = NOR Flash [MB]
N = NAND Flash [MB]

RAM
S = SDRAM [MB]

Blackfin® Development Boards

ADEV-BF52xC

Feature rich, low cost embedded audio development platform which supports Audio Core Modules (ACM). The form factor of the ADEV-BF52xC allows easy integration of the board into OEM products. Dedicated interfaces such as USB2.0, Line In/Out, headphone out and an onboard silicon microphone turn the ADEV-BF52xC into a full-featured development platform for most embedded audio applications in commercial areas.

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 a 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.

eDEV-BF5xx

Feature rich, low cost rapid development platform which provides all interfaces on dedicated connectors and has all Core Module pins routed to solder pads which easily can be accessed by the developers. The eDEV-BF5xx supports the latest debugging interface from Analog Devices - ADI-SADA (Analog Devices Stand Alone Debug Agent).

EVAL-BF5xx

Tiny, low cost embedded platform which supports Bluetechnix powerful Blackfin® based Core Modules. The form factor (75x75mm) of the EVAL-BF5xx allows easy integration of the board into OEM products. Dedicated interfaces such as USB2.0, SD-card slot, CAN interface connectors and of course Ethernet, turn the EVAL-BF5xx into a full-featured evaluation platform for most embedded applications.

Extender boards

Extender boards (EXT-BF5xx) are expanding the development and evaluation boards by several interfaces and functionalities. Targeted application areas are: audio/video processing, security and surveillance, Ethernet access, positioning, automation and control, experimental development and measuring.

Note! Bluetechnix is offering tailored board developments as well.

1 Introduction

The CM-BF527 is optimized on performance and functionality. The module integrates processor, RAM, flash, external peripheral controllers and power supply at a size of 31.5x36.5mm! It is based at the high performance ADSP-BF527 from Analog Devices. The Core-Module is designed for commercial usage (commercial temperature range). It addresses 32MByte SDRAM via its 16bit wide SDRAM bus and has an onboard NOR-flash of 8MByte. The processor features a built in USB-OTG 2.0 unit and there is an extra Ethernet physical transceiver onboard.

1.1 Overview

Figure 1-1 shows the main components of the Core Module CM-BF527
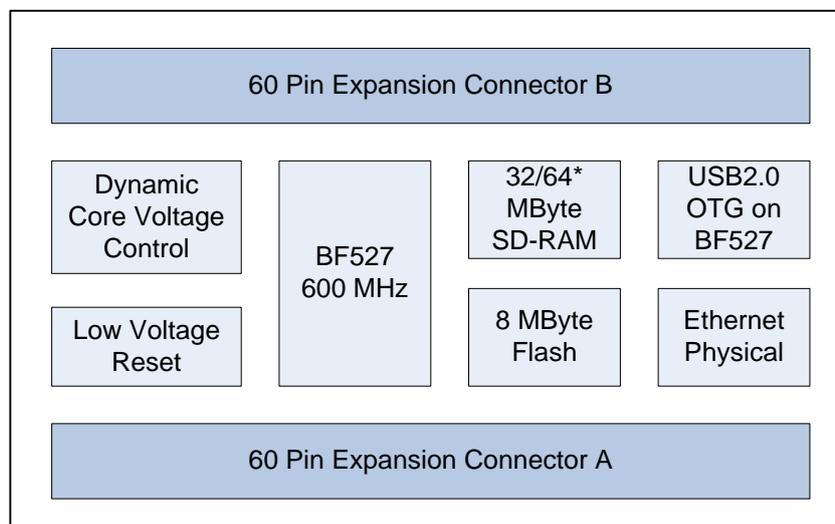
Figure 1-1: Main components of the CM-BF527 Core Module

*Version dependent (see chapter 8.1)

- **Analog Devices Blackfin Processor ADSP-BF527**

  o ADSP-BF527KBCZ with 600MHz

- **32 MB SDRAM**
  o 32MByte SDRAM Version (see chapter 8.1)
    - SDRAM Clock up to 133MHz
    - MT48LC16M16A2BG-7 (16Mx16, 256Mbit at 3.3 V)

  o 64MByte SDRAM Version(see chapter 8.1)
    - SDRAM Clock up to 143MHz
    - IS42S16320B-7BL (8M x16x4, 512Mbit at 3.3 V)

- **8 MB of Byte Addressable Flash**
  o 32MByte SDRAM Version (see chapter 8.1)

    - PF48F2000P0ZBQ0 (4Mx16, 64Mbit at 3.3V; addressable by 4 banks, 2MB each, controlled over GPIOs)

- Additional flash memory can be connected through the expansion board as parallel Flash using asynchronous chip select lines or as a SPI flash.

  o 64MByte SDRAM Version(see chapter 8.1)

    - PF48F3000P0ZBQE (addressable by 4 banks, 2MB each, controlled over GPIOs)

    - Additional flash memory can be connected through the expansion board as parallel Flash using asynchronous chip select lines or as a SPI flash.

- **Ethernet Physical Transceiver**

  o Micrel KSZ8041

- **Low Voltage Reset Circuit**

  o Resets module if power supply goes below 2.93 V for at least 140 ms

- **Dynamic Core Voltage Control**

  o Allows adjusting of the core voltage by setting software registers on the Blackfin processor

  o Core voltage range: 0.8 – 1.2V

- **Expansion Connector A**

  o Data Bus

  o Address Bus

  o Control Signals

  o USB2.0 OTG

  o Ethernet Pins

- **Expansion Connector B**

  o PG (0..15) SPI, UART, SPORT, GPIO

  o JTAG

  o TWI (I2C compatible)

  o Power

  o PPI (Parallel Port Interface) , SPORT

  o Boot Mode

  o GPIO's

1.2 Key Features

- The CM-BF527 is a low cost compact core module and measures only 36x31mm
- Allows quick prototyping of product that comes very close to the final design
- Reduces development costs, faster time to market
- Very cost effective for small and medium volumes

1.3 Applications

- Mobile Embedded Device
- Network connected embedded system
- Industrial control
- Voice over IP (VoIP)
- Multi-media application processor
- Multi-media accessories - e.g. docks
- Networked audio
- Instrumentation
- Imaging

2 General Description

2.1 Functional Description
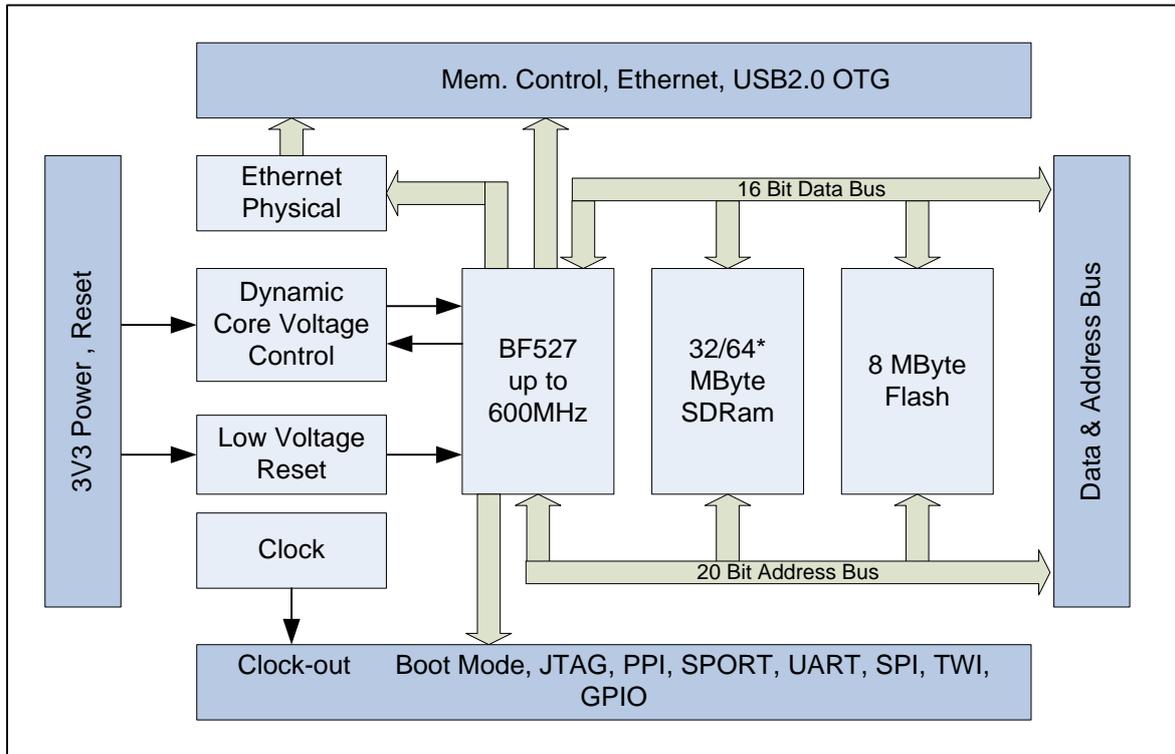
Figure 2-1: Detailed block diagram

*Version dependent (see chapter 8.1)

Figure 2-1 shows a detailed block diagram of the CM-BF527 module. Besides the SDRAM control pins and the pins used by the Ethernet physical transceiver (port H) the CM-BF527 has all other pins of the Blackfin processor on its two main 60 pin connectors.

A special feature of the CM-BF527 Core Module is the on-board physical Ethernet transceiver from Micrel (KSZ8041).

Dynamic voltage control allows reduction of power consumption to a minimum adjusting the core voltage and the clock frequency dynamically in accordance to the required processing power. A low voltage reset circuit guarantees a power on reset and resets the system when the input voltage drops below 2.93V.

2.2 Boot Mode

By default the boot mode = 0000 (BMODE3 = low, BMODE2 = low, BMODE1 = low, BMODE0 = low). All BMODE pins have internal pull down resistors.

Switch Settings BM3,BM2,BM1,BM0	Boot Mode	Description
0000	0 (default)	Idle - No boot Reserved
0001	1	Boot from 8- or 16-bit external flash memory
0010	2	Boot from 16-bit asynchronous FIFO.
0011	3	Boot from serial SPI memory (EEPROM or flash)
0100	4	Boot from SPI host device
0101	5	Boot from serial TWI memory (EEPROM/flash)
0110	6	Boot from TWI host
0111	7	Boot from UART0 Host
1000	8	Boot from UART1 Host
1001	9	Reserved
1010	10	Boot from SDRAM
1011	11	Boot from OTP memory
1100	12	Boot from 8-bit NAND flash via NFC using PORTF data pins
1101	13	Boot from 8-bit NAND flash via NFC using PORTH data pins
1110	14	Boot from 16-Bit Host DMA
1111	15	Boot from 8-Bit Host DMA

Connect BMODE0 to Vcc and leave BMODE1, BMODE2 and BMODE3 pins open for Boot Mode 0001 equals to 8 or 16 bit PROM/FLASH boot mode. This is the default boot mode of the BLACKSheep® OS and uClinux.

Note: Boot Modes 8-15 are not supported with the DEV-BF5xx-DALite or EVAL-BF5xx

2.3 Memory Map

2.3.1 Core Module Memory

Memory Type	Start Address	End Address	Size	Comment
FLASH [1] PH9 Flag **Low** PG11 Flag **Low**	0x20000000	0x201FFFFF	2MB	¼ of 8MB Flash, PF48F2000P0ZBQ0S
FLASH [1] PH9 Flag **High** PG11 Flag **Low**	0x20000000	0x201FFFFF	2MB	¼ of 8MB Flash, PF48F2000P0ZBQ0S
FLASH [1] PH9 Flag **Low** PG11 Flag **High**	0x20000000	0x201FFFFF	2MB	¼ of 8MB Flash, PF48F2000P0ZBQ0S
FLASH [1] PH9 Flag **High** PG11 Flag **High**	0x20000000	0x201FFFFF	2MB	¼ of 8MB Flash, PF48F2000P0ZBQ0S
SD-RAM	0x00000000	0x01FFFFFF	32MB	16Bit Bus, Micron MT48LC16M16A2FG

*[1] Please be aware that you have to unlock the flash before starting an erase process!

The maximum amount of memory addressable by a single asynchronous memory bank, of the Blackfin processor is 2MB. In order to be able to use more than 2MB on a single bank, 2 GPIOs are used to select which 2MB section of flash is visible in the memory window of the Blackfin processor. This frees up the remaining banks for the user.

If one or both IO pins are needed and 4MB or 2 MB flash memory is sufficient for your application, move the 0Ω resistors R26 to R24 for PG11 and R19 to R14 for PH9 from your Core Module. The flash address lines A20 and A21 are pulled low.
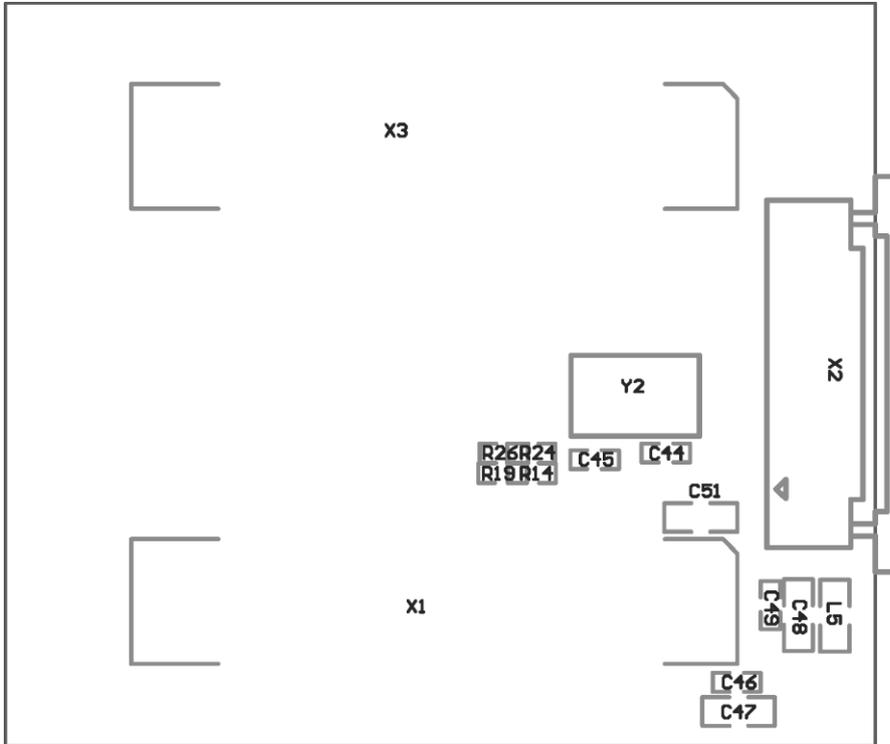
Figure 2-2 - Assembly drawing bottom view

To access more than 8MB flash memory (64MB) you can add the 0Ω resistor array R2. But be aware to not connect the IO pins PG10, PG9 and PG1.

Flash Address Pin	Blackfin Flag	CM Pin Number
A20	PH9	55
A21	PG11	8
A22	PG10	54
A23	PG9	7
A24	PG1	39

Figure 2-3: IO pin to flash address pin assignment

2.3.2 Externally Addressable Memory (on connector)

The Blackfins External Bus Interface (EBI) allows connecting devices via an asynchronous memory interface.

AMS Line	Start Address	End Address	Max. Size
nAMS2	0x20200000	0x202FFFFF	1MB
nAMS3	0x20300000	0x203FFFFF	1MB

Table 2-1: Externally addressable memory

3 Specifications

3.1 Electrical Specifications

3.1.1 Operating Conditions

Symbol	Parameter	Min	Typical	Max	Unit
V_{IN}	Input supply voltage	3.0	3.3	3.6	V
I_{3V3}[1]	3.3V current	-	350	-	mA
V_{OH}	High level output voltage	2.4	-	-	V
V_{OL}	Low level output voltage	-	-	0.4	V
I_{IH}	IO input current	-	-	10	µA
I_{OZ}	Three state leakage current	-	-	10	µA
I_{RTC}	V_{RTC} current	-	20	-	µA
I_{USB_FS}	V_{USB} current in low/full speed mode	-	9	-	mA
I_{USB_HS}	V_{USB} current in high speed mode	-	25	-	mA
f_{CCLK}	Core clock frequency	400	-	600	MHz

Table 3-1: Electrical characteristics

[1] Average load @ 25°C ambient temperature

3.1.2 Maximum Ratings

Stressing the device above the rating listed in the absolute maximum ratings table may cause permanent damage to the device. These are stress ratings only. Operation of the device at these or any other conditions greater than those indicated in the operating sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Symbol	Parameter	Min	Max	Unit
V_{IO}	Input or output voltage	-0.5	3.6	V
V_{IN}	Input supply voltage	3.0	5.5	V
I_{OH} /I_{OL}	Current per pin	0	10	mA
T_{AMB}	Ambient temperature	-40	85	°C
T_{STO}	Storage temperature	-55	150	°C
T_{SLD}	Solder temperature for 10 seconds		260	°C
ϕ_{AMB}	Relative ambient humidity		90	%

Table 3-2: Absolute maximum ratings

3.1.3 ESD Sensitivity

ESD (electrostatic discharge) sensitive device. Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjected to high energy ESD. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.

4 Connector Description

In the following tables you will find pin assignments for the Core Module connectors. Most pins are directly connected to the Blackfin processor. If not, please read the Notes below the table.

4.1 Connector X1

Pin No.	Signal Name	Type	Function
1	VppOTP	Power[1]	OTP programming voltage
2	PH11/ND_WE/ETxD3/HOST_D11	IO	NAND Interface
3	PH13/ND_BUSY/ERxCLK/HOST_D13	IO	NAND Interface
4	PH15/ND_ALE/COL/HOST_D15	IO	NAND Interface
5	CLKBUF	IO	Buffered clock (50MHz)
6	SDA	IO	I2C
7	PG9 / RSCLK0A/ TMR5 / TACI5	IO	SPORT, Timer
8	NC[2] or PG11 / TMR7 / HOST_WR	IO – 10k pull down	Timer
9	Vin 3V3	Power	
10	Vin 3V3	Power	
11	PF0 / PPID0 / DR0PRI / ND_D0A	IO	PPI data, SPORT, NAND interface
12	PF2 / PPI D2 / RSCLK0 / ND_D2A	IO	PPI data, SPORT, NAND interface
13	PF4 / PPI D4 / TFS0 / ND_D4A / TACLK0	IO	PPI data, SPORT, NAND interface
14	PF6 / PPI D6 / DT0SEC / ND_D6A / TACI0	IO	PPI data, SPORT, NAND interface
15	PF8 / PPID8 / DR1PRI	IO	PPI data, SPORT
16	PF10 / PPID10 / RFS1 / SPISEL7	IO	PPI data, SPORT
17	PF12 / PPID12 / DT1PRI / SPISEL2 / CDG	IO	PPI data, SPORT
18	PF14 / PPID14 / DT1SEC / UART1TX	IO	PPI data, SPORT, UART
19	PG6 / DT0PRIA / TMR2 / PPIFS3	IO	SPORT, Timer, PPI frame sync
20	PPIFS1 / TMR0	IO	PPI frame sync, Timer
21	PPIFS1 / TMR0	IO	PPI frame sync, Timer
22	PG13 / DMAR0 / UART1RXA / H_ADR / TACI2	IO	UART
23	PG8 / TMR4 / RFS0A / UART0RX / TACI4	IO	Timer, SPORT, UART
24	PG4 / SPIMOSI / DT0SECA	IO	SPI, SPORT
25	PG2 / SPISCK	IO	SPI clock
26	Bmode0	I - 10k pull down	Boot mode
27	GND	Power	
28	TCK	I - 10k pull up	JTAG
29	TDI	I - 10k pull up	JTAG
30	TRST	I - 4k7 pull down	JTAG
31	EMU	O	JTAG
32	TMS	I – 10k pull up	JTAG
33	TDO	O	JTAG
34	Bmode2	I -10k pull down	Boot mode
35	Bmode3	I -10k pull down	Boot mode
36	Bmode1	I -10k pull down	Boot mode
37	PG3 / SPIMISO / DR0SECA	IO	SPI, SPORT
38	PG7 / TMR3 / DR0PRIA / UART0TX	IO	Timer, SPORT, UART
39	PG1 / SPISS/ SPISEL1	IO	SPI slave select
40	PG12 / DMAR1 / UART1TXA / H_ACK	IO	UART
41	PPICLK / TMRCLK	IO	PPI clock, Timer clock
42	PG5 / TMR1 / PPIFS2	IO	Timer, PPI frame sync
43	PF15 / PPID15 / DR1SEC / UART1RX / TACI3	IO	PPI data, SPORT, UART

Pin No.	Signal Name	Type	Function
44	PF13 / PPID13 / TSCLK1 / SPISEL3 / CUD	IO	PPI data, SPORT
45	PF11 / PPID11 / TFS1 / CZM	IO	PPI data, SPORT
46	PF9 / PPID9 / RSCLK1 / SPISEL6	IO	PPI data, SPORT
47	PF7 / PPID7 / DR0SEC / ND_D7A / TACI1	IO	PPI data, SPORT, NAND interface
48	PF5 / PPID5 / TSCLK0 / ND_D5A / TACLK1	IO	PPI data, SPORT, NAND interface
49	PF3 / PPID3 / DT0PRI / ND_D3A	IO	PPI data, SPORT, NAND interface
50	PF1 / PPID1 / RFS0 / ND_D1A	IO	PPI data, SPORT, NAND interface
51	GND	Power	
52	GND	Power	
53	USB_VBUS	I/O	USB
54	PG10 / TMR6 / TSCLK0A / TACI6	IO	Timer, SPORT
55	NC[2] or PH9/SPISEL5/ETxD2/HOST_D9/TACLK3	IO – 10k pull down	
56	SCL	O	I2C
57	PG0 / HWAIT	IO	Boot host wait
58	PH14/ND_CLE/ERxDV/HOST_D14	IO	NAND interface
59	PH12/ND_RE/ERxD3/HOST_D12	IO	NAND interface
60	PH10/ND_CE/ERxD2/HOST_D10	IO	NAND interface

Table 4-1: Connector description X1

[1] Internally connected to 2.5V. If you want to program the OTP memory, just power this pin with 7.0V.

[2] These IO pins are normally used to access more flash memory. They should not be used as general purpose IO pins.

For more information please see chapter 2.3.

4.2 Connector X2

Pin No.	Signal Name	Type	Function
61	A1	O	Address bus
62	A3	O	Address bus
63	A5	O	Address bus
64	A7	O	Address bus
65	A9	O	Address bus
66	A11	O	Address bus
67	A13	O	Address bus
68	A15	O	Address bus
69	A17	O	Address bus
70	A19	O	Address bus
71	ABE1	O	Byte Enable
72	LED_ACT	IO	Ethernet
73	GND	Power	
74	RX+	IO – 49R9 pull up to 2V5	Ethernet
75	RX-	IO – 49R9 pull up to 2V5	Ethernet
76	ARDY	I	Hardware ready control
77	USBD+	I/O	USB
78	SCLK	O	Blackfin CLKOUT
79	GND	Power	
80	AMS3	O	Memory select
81	AWE	O	Write Enable
82	NMI	I -10k pull up	Non makeable interrupt
83	D0	IO	Data Bus

Pin No.	Signal Name	Type	Function
84	D2	IO	Data Bus
85	D4	IO	Data Bus
86	D6	IO	Data Bus
87	D8	IO	Data Bus
88	D10	IO	Data Bus
89	D12	IO	Data Bus
90	D14	IO	Data Bus
91	D15	IO	Data Bus
92	D13	IO	Data Bus
93	D11	IO	Data Bus
94	D9	IO	Data Bus
95	D7	IO	Data Bus
96	D5	IO	Data Bus
97	D3	IO	Data Bus
98	D1	IO	Data Bus
99	RESET	I/O see chapter 3.5	Reset
100	AOE	O	Output enable
101	ARE	O	Read enable
102	AMS2	O	Memory select
103	VDD-RTC	Power	
104	USBD-	I/O	USB
105	USB_OTG_ID	I	USB OTG
106	VA33	Power Out	Ethernet
107	TX-	IO – 49R9 pull up to 2V5	Ethernet
108	TX+	IO – 49R9 pull up to 2V5	Ethernet
109	LED_FD	IO	Ethernet
110	LED_SPEED	IO	Ethernet
111	ABE0	O	Byte Enable
112	A18	O	Address bus
113	A16	O	Address bus
114	A14	O	Address bus
115	A12	O	Address bus
116	A10	O	Address bus
117	A8	O	Address bus
118	A6	O	Address bus
119	A4	O	Address bus
120	A2	O	Address bus

Table 4-2: Connector description X2

5 Application Information

5.1 Supply Voltage Decoupling

For a better stability we recommend to add a 100nF capacitor for each power supply pin and a 47uF tantalum capacitor to the V_{IN} voltage rail next to the module.

5.2 Reset circuit

The reset of the flash and the processor are connected to a power monitoring IC. The output can be used as power on reset for external devices, see Figure 5-1.
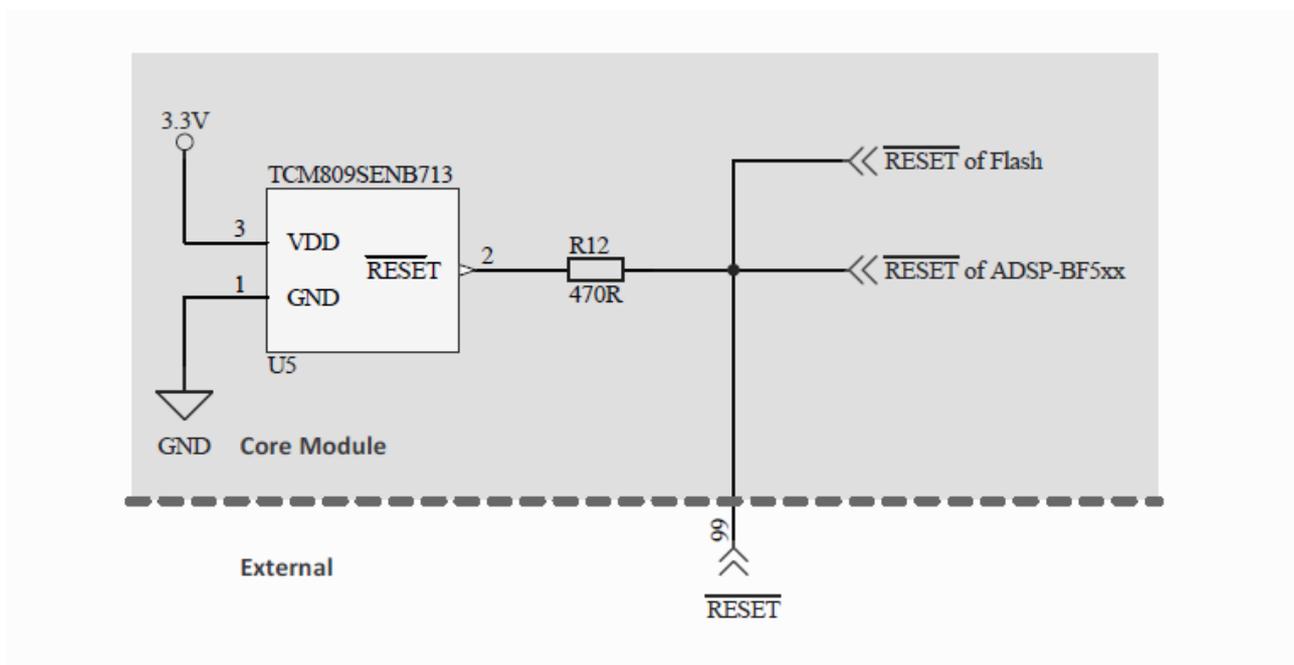

Figure 5-1: Schematic of reset circuit on the Core Module

5.3 Application Example Schematics

5.3.1 RJ45 schematic

The KSZ8041 is connected via the RMII to the processor.

The Rx and Tx pairs should be routed with 100 Ω differential lines.
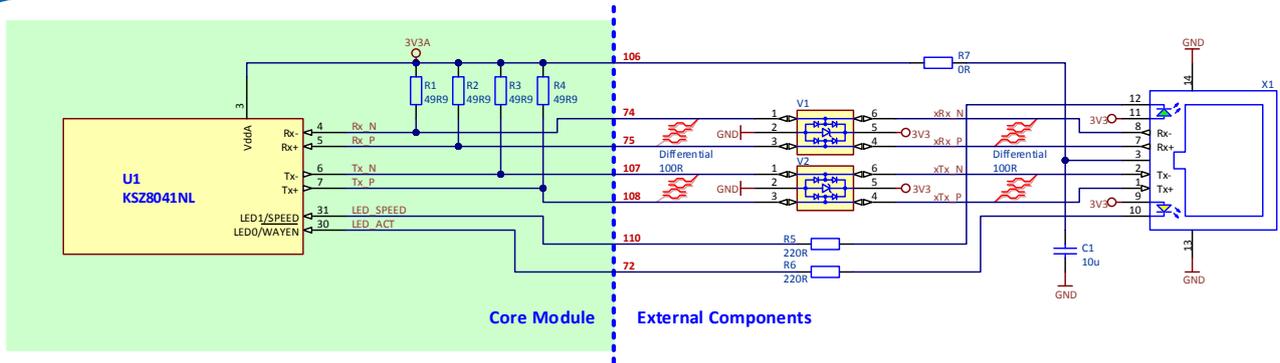
Figure 5-2: Schematic for RJ45 connection

Designator	Value	Type	Description	Quantity
X1		RJLBC-060TC1	RJ45 with magnetics	1
R5, R6	220 Ω		Resistor	2
R7	0 Ω		Resistor	1
C1	10 uF			1
V1, V2		USBLC6-2P6	TSV-Diode	2

Table 5-1: Bill of material RJ45

5.3.2 Ethernet and JTAG
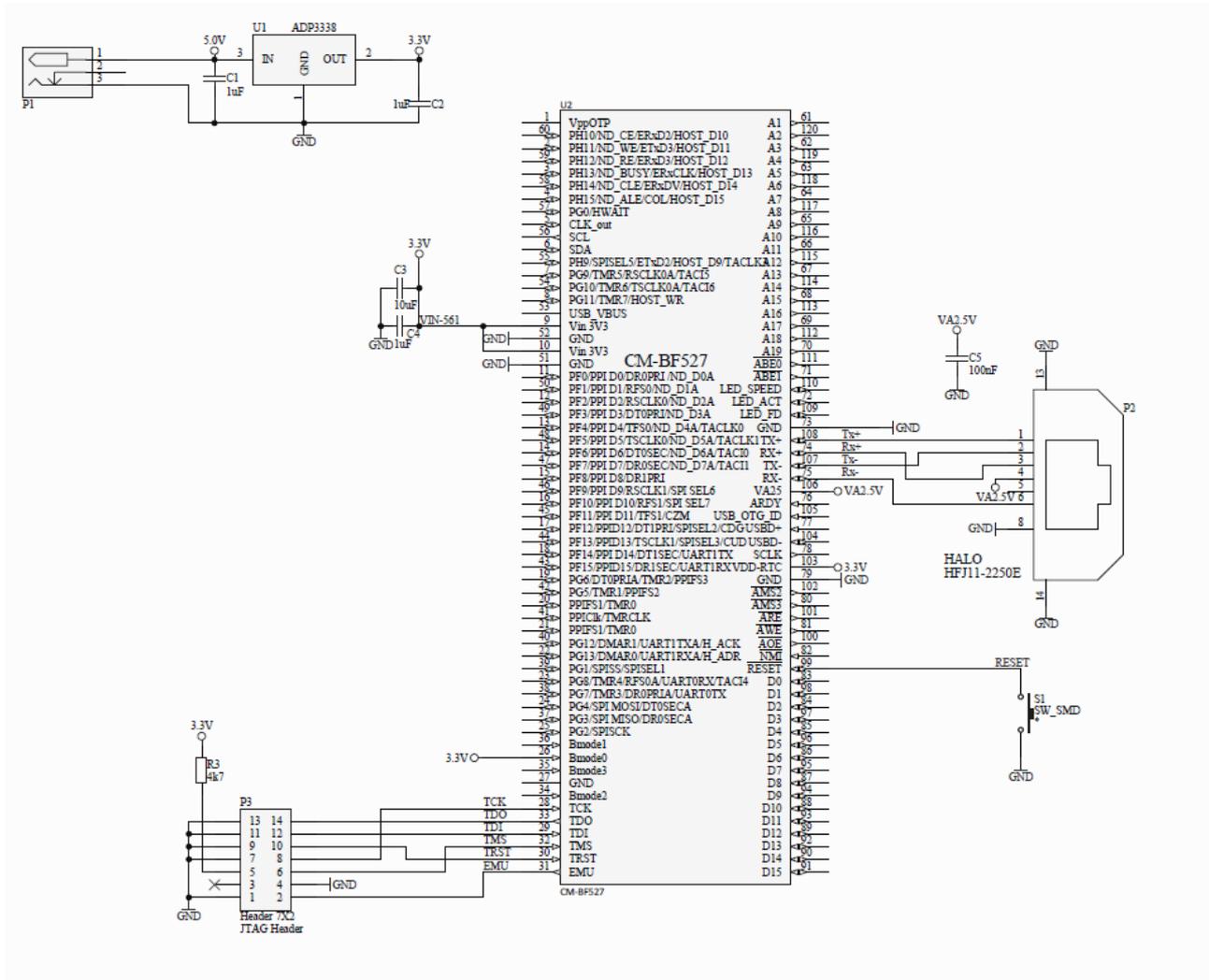
Figure 5-3: Configuration with Ethernet and JTAG connector

Designator	Value	Type	Description	Quantity
C3, C4, C5, C6, C8	1u		Capacitor	6
C7	10u		Capacitor	1
C9	100n		Capacitor	1
Cam1		OV2640FSL	Camera module	1
DS1	green		SMD LED	1
P1		DC-8	Power connector DC-8	1
P2		HFJ11-2250E	RJ45 with transformer	1
R2	220		Resistor	2
R1,R3	10k		Resistor	3
S1, S2			Switch	1
U1		ADP3338	Low dropout regulator	1
U2		XC6204B252MR	XC6204 LDO regulators	1
U3		XC6204B182MR	XC6204 LDO regulators	1
CM1			CM-BF527	1

Table 5-2: Bill of material of ETH and JTAG

5.3.3 Stand-alone Ethernet based MPEG Webcam

The CM-BF527 module can be used as a stand-alone module for a camera system requiring only power supply and the direct attachment of a compatible video camera. An extender board including a camera is available at Bluetechnix (EXT-BF5xx-CAM).
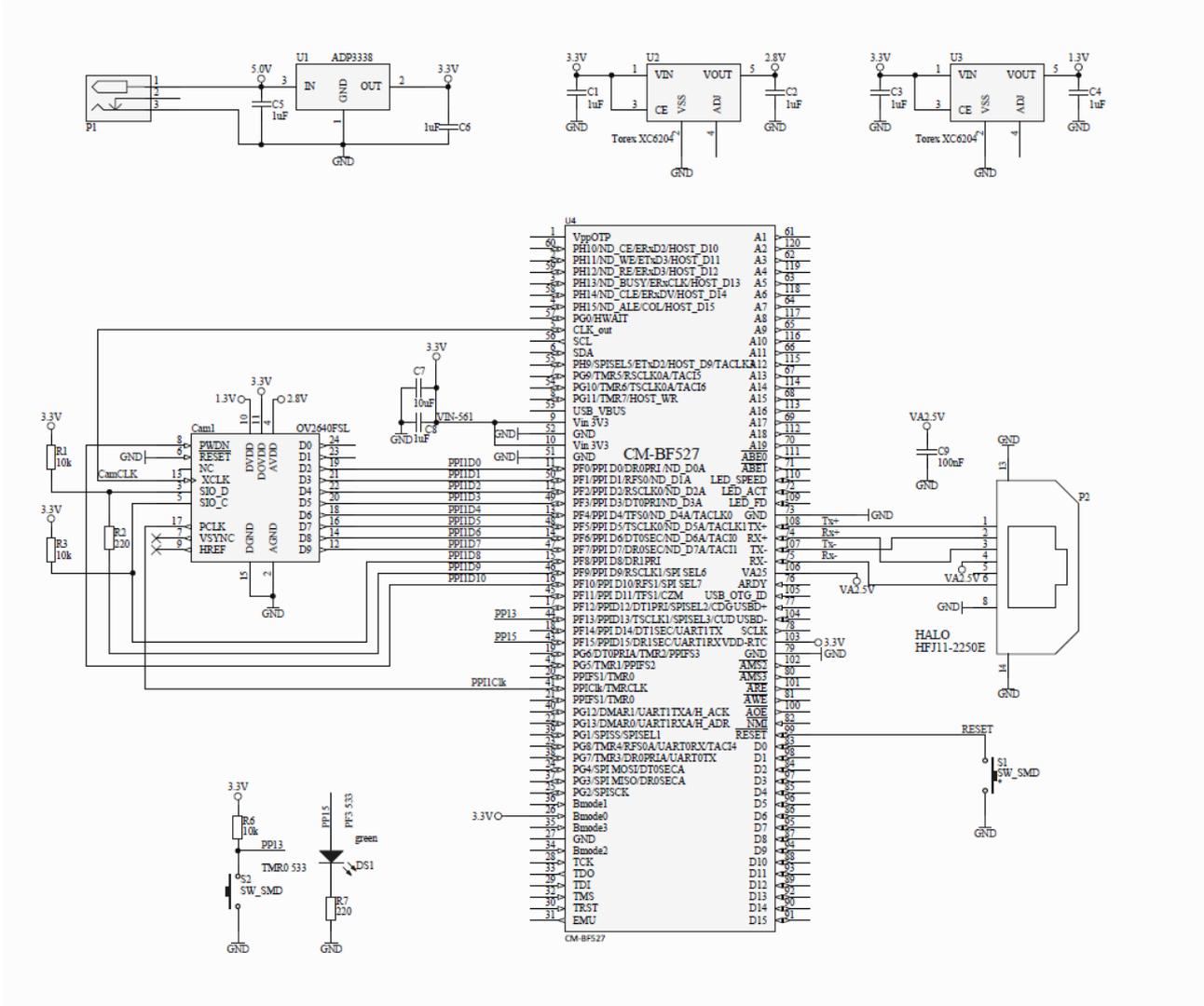

Figure 5-4: Stand-alone Ethernet based MPEG webcam

6 Mechanical Outline

## 6.1 Top View

All dimensions are given in millimeters!
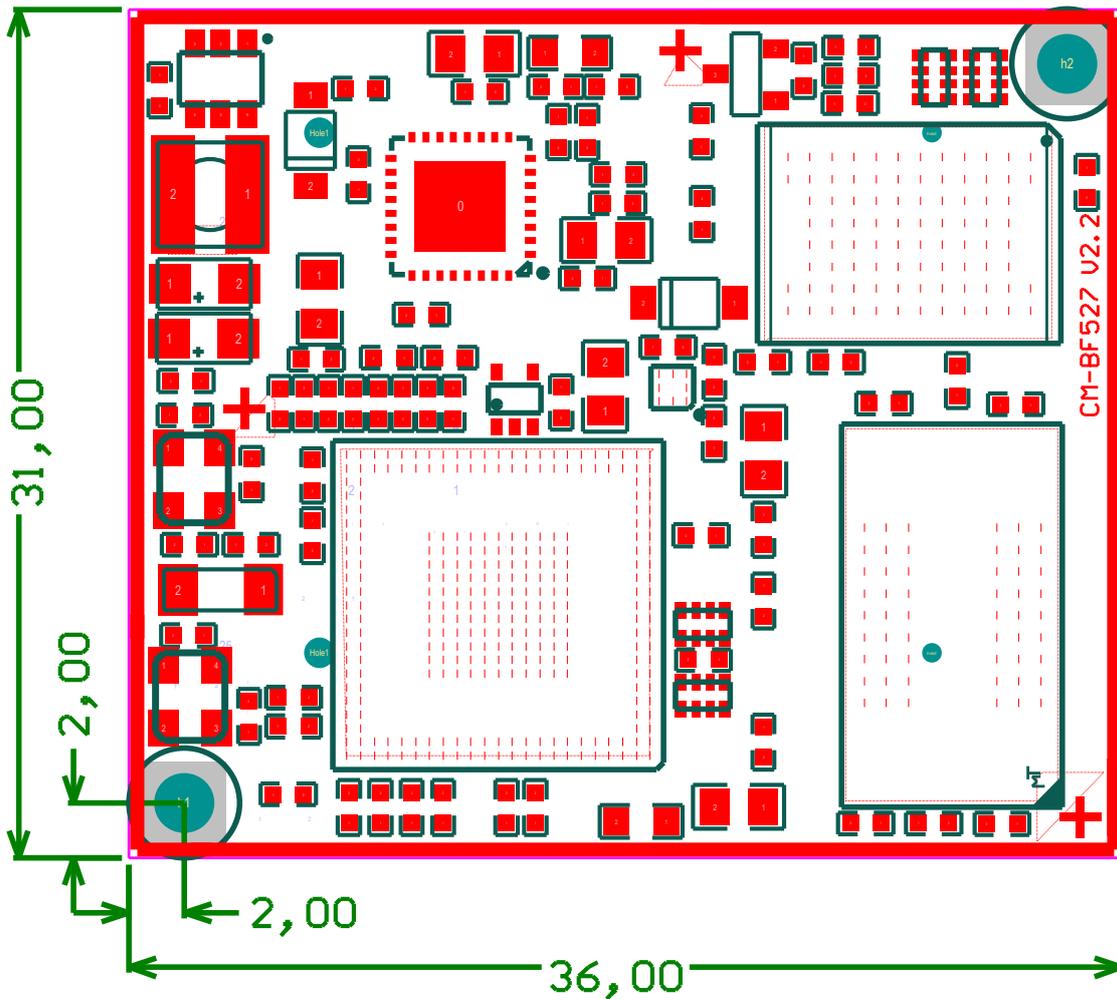
Figure 6-1: Mechanical outline and components on top side

Take 0.5mm as a tolerance for the boarder of the board since it is broken out from a multi-board panel and some additional boarder may remain.

The module is shipped with two 60pin connectors.

6.2 Bottom View

Figure 6-2 shows the TOP VIEW of the bottom placed connectors (through the Board View) of the CM-BF527 Core Module. All dimensions are given in millimeters!
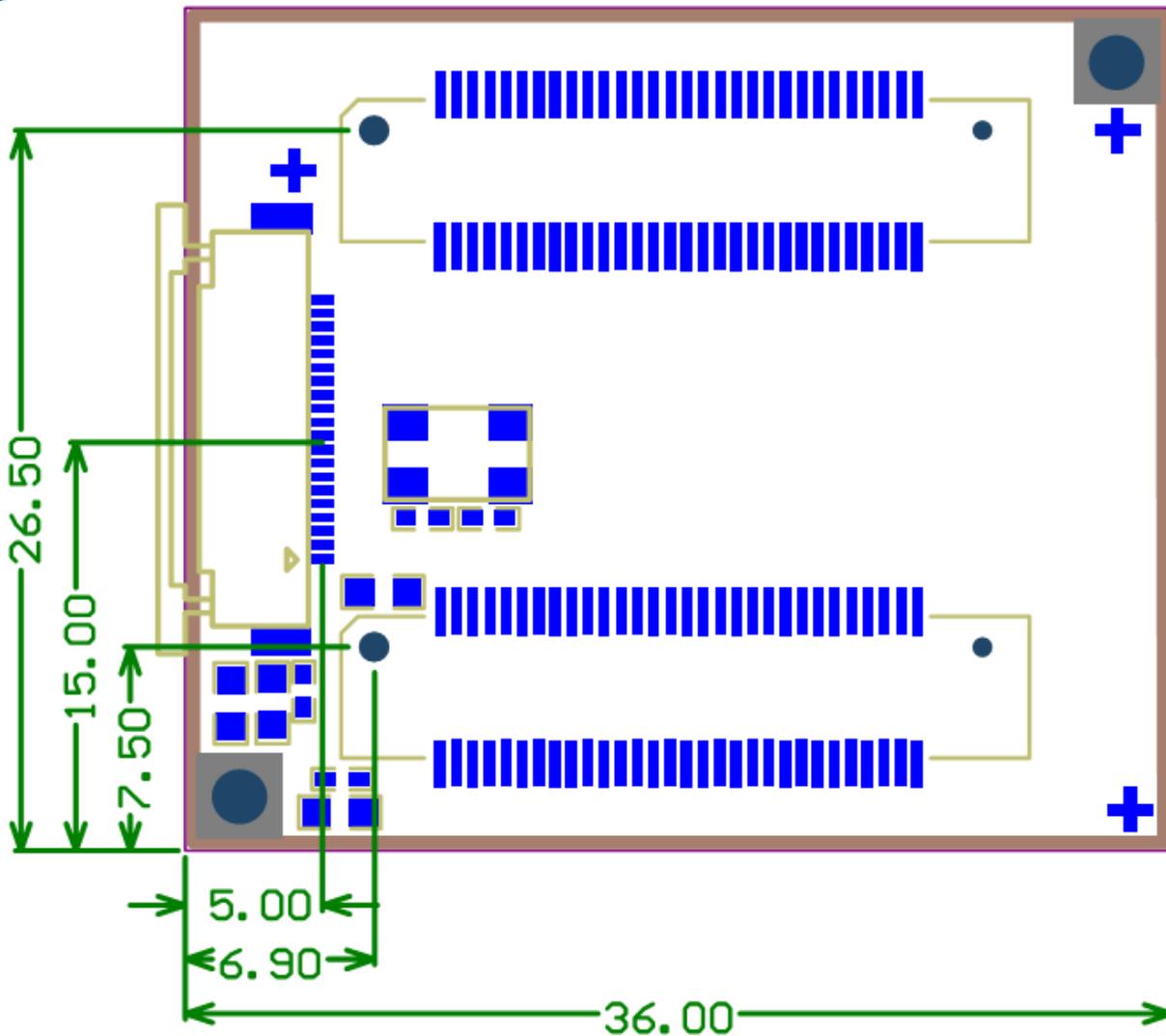
Figure 6-2: Mechanical outline and bottom connectors (top view)

The mechanical outline represents a TOP VIEW of the connectors placed at the bottom of the core board.

6.3   Side View
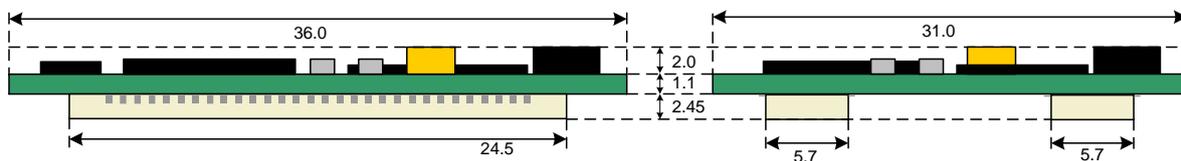
Figure 6-3: Side View with connector mounted, 0.5mm tolerances

6.4   Footprint

The footprint of the baseboard may look as shown in Figure 6-4. Table 6-2 shows the usable connector types.
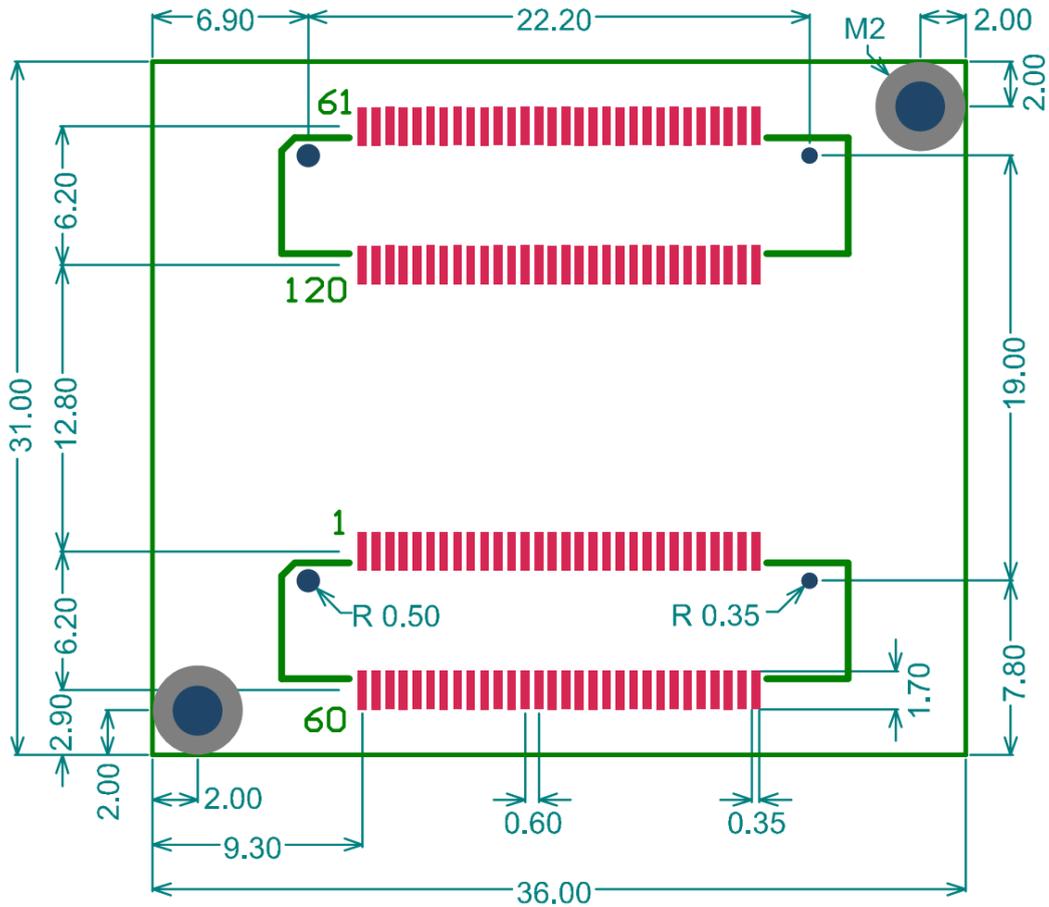
Figure 6-4: Recommended footprint of the Core Module (top view)

If there is no need to affix the Core Module, then you may omit the two M2 screwing holes.

6.5 Connectors

Connector Core Module	Connector (Matching)	Manufacturer	Manufacturer Part No.
X2,X3	X2	Hirose	FX8-60P-SV

Table 6-1: Core Module connector types

The Core Module features 2 connectors, one male and one female. The base board uses the same connectors but oriented in the opposite way.

Connector	Connector (Matching)	Manufacturer	Manufacturer Part No.
XY,XZ	X2,X3	Hirose	FX8-60S-SV

Table 6-2: Baseboard connector types

Note the additional connector X1 (FFC-20) is not supported yet and used for AUDIO functionality in future revisions with the –C variant of the ADSP-BF527 Chip. X1 is not described in this document any further.

7 Support

7.1 General Support

General support for products can be found at Bluetechnix' support site https://support.bluetechnix.at/wiki

7.2 Board Support Packages

Board support packages and software downloads are for registered customers only https://support.bluetechnix.at/software/

7.3 Blackfin® Software Support

7.3.1 BLACKSheep® OS

BLACKSheep® OS stands for a powerfully and multithreaded real-time operating system (RTOS) originally designed for digital signal processing application development on Analog Devices Blackfin® embedded processors. This high-performance OS is based on the reliable and stable real-time VDK kernel from Analog Devices that comes with VDSP++ IDE. Of course BLACKSheep® OS is fully supported by all Bluetechnix Core-Modules and development hardware.

7.3.2 LabVIEW

You can get LabVIEW embedded support for Bluetechnix Core Modules by Schmid-Engineering AG http://www.schmid-engineering.ch.

7.3.3 uClinux

You can get uClinux support (boot loader and uClinux) for Bluetechnix Core Modules at http://blackfin.uClinux.org.

7.4 Blackfin® Design Services

Based on more than seven years of experience with Blackfin, Bluetechnix offers development assistance as well as custom design services and software development.

7.4.1 Upcoming Products and Software Releases

Keep up to date with all product changes, releases and software updates of Bluetechnix at http://www.bluetechnix.com.

8 Ordering Information

CM - BF527 - C - C - Q50 S32/64 F8 - - (CM-BF527)

Product Family
CM = Core Module
SBC = Single Board Computer

CPU-Type
Equals the name of CPU

Connection-Type
A = BGA
B = Border pad
C = Connector
S = Special

Operating Temperature Range
A = Automotive
C = Commercial
I = Industrial

Crystal Frequency
Notation: QXX[MHz]

Former name

Special
Custom Core Modules or specials
uC = uclinux

Extra controllers mounted
E = Ethernet
U = USB

Flash [MB]
F = NOR Flash [MB]
N = NAND Flash [MB]

RAM
S = SDRAM [MB]

8.1 Predefined mounting options for CM-BF527

Article Number	Name	Temperature Range
100-1253-2	CM-BF527-C-C-Q50S32F8 (CM-BF527)	Commercial
100-1254-2	CM-BF527-C-C-Q50S64F8 (CM-BF527-64SD)	Commercial

Table 8-1: Ordering information

NOTE: Custom Core Modules are available on request! Please contact Bluetechnix (office@bluetechnix.com) if you are interested in custom Core Modules.

9 Dependability

9.1 MTBF

Please keep in mind that a part stress analysis would be the only way to obtain significant failure rate results, because MTBF numbers just represent a statistical approximation of how long a set of devices should last before failure. Nevertheless, we can calculate an MTBF of the Core Module using the bill of material. We take all the components into account. The PCB and solder connections are excluded from this estimation. For test conditions we assume an ambient temperature of 30°C of all Core Module components except the Blackfin® processor (80°C) and the memories (70°C). We use the MTBF Calculator from ALD (http://www.aldservice.com/) and use the reliability prediction MIL-217F2 Part Stress standard. Please get in touch with Bluetechnix (office@bluetechnix.com) if you are interested in the MTBF result.

10 Product History

10.1 Version Information

10.1.1 CM-BF527-C-C-Q50S32F8 (CM-BF527)

Version	Component	Type
2.2.2	Processor RAM Flash ETH-Physical	ADSP-BF527 KBCZ-6 (Rev 0.2) IS42S16160D-7BL PF48F2000P0XBQ0 KSZ8041

Table 10-1: Overview CM-BF527-C-C-Q50S32F8 (CM-BF527) product changes

10.1.2 CM-BF527-C-C-Q50S64F8 (CM-BF527-64SD)

Version	Component	Type
2.2.1	Processor RAM Flash ETH-Physical	ADSP-BF527KBCZ-6 (Rev 0.2) IS42S16320B-7BL (64MB) PF48F2000P0ZBQ0A (8MB) KSZ8041
2.2.2	Processor RAM Flash ETH-Physical	ADSP-BF527KBCZ-6 (Rev 0.2) IS42S16320B-7BL (64MB) PF48F3000P0ZBQE (16MB) KSZ8041

Table 10-2: Overview CM-BF527-C-C-Q50S64F8 (CM-BF527-64SD) product changes

10.2 Anomalies

Version	Date	Description
2.2.2	2011 05 10	No anomalies reported yet.

Table 10-3: Overview product anomalies

11 Document Revision History

Version	Date	Document Revision
6	2015 02 13	Function description pin 78 updated
5	2015 01 27	Ethernet connection diagram update
4	2012 06 01	Updated product photo
3	2011 10 18	Table 3-1: Electrical characteristics update
2	2011 05 11	Added Figure 2-2 and updated design.
1	2010 06 28	Updated to new design from CM-BF527 V1.x HUM.

Table 11-1: Revision history

12 List of Abbreviations

Abbreviation	Description
ADI	Analog Devices Inc.
AI	Analog Input
AMS	Asynchronous Memory Select
AO	Analog Output
CM	Core Module
DC	Direct Current
DSP	Digital Signal Processor
eCM	Enhanced Core Module
EBI	External Bus Interface
ESD	Electrostatic Discharge
GPIO	General Purpose Input Output
I	Input
I²C	Inter-Integrated Circuit
I/O	Input/Output
ISM	Image Sensor Module
LDO	Low Drop-Out regulator
MTBF	Mean Time Between Failure
NC	Not Connected
NFC	NAND Flash Controller
O	Output
OS	Operating System
PPI	Parallel Peripheral Interface
PWR	Power
RTOS	Real-Time Operating System
SADA	Stand Alone Debug Agent
SD	Secure Digital
SoC	System on Chip
SPI	Serial Peripheral Interface
SPM	Speech Processing Module
SPORT	Serial Port
TFT	Thin-Film Transistor
TISM	Tiny Image Sensor Module
TSC	Touch Screen Controller
UART	Universal Asynchronous Receiver Transmitter
USB	Universal Serial Bus
USBOTG	USB On The Go
ZIF	Zero Insertion Force

Table 12-1: List of abbreviations

A   List of Figures and Tables

Figures

Tables