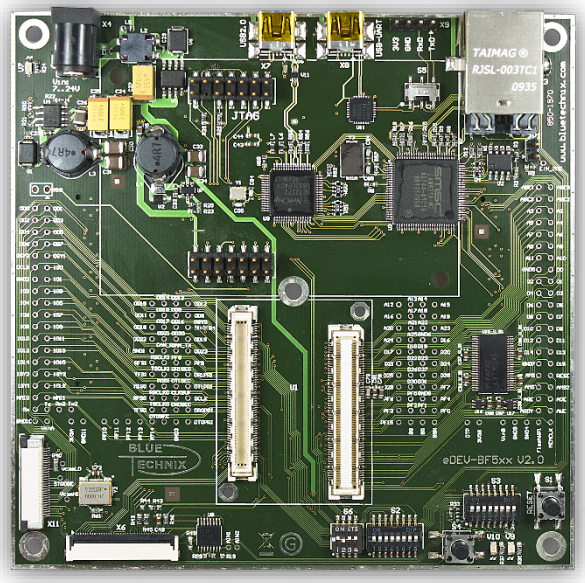
BLUETECHNIX
Embedding Ideas

eDEV-BF5xx



Hardware User Manual

Version 2.1

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Table of Contents

1 Introduction 5
1.1 Overview 5
1.2 Key Features 6
1.3 Applications 7
2 General Description 8
2.1 Functional Description 8
2.1.1 Powering 9
2.1.2 Data Line Buffering 9
2.1.3 USB 9
2.1.4 Ethernet 9
2.1.5 SD-Card 9
2.1.6 Image Sensors (BLT-ISM-Connector) 9
2.1.7 RGB-TFT Display 9
2.2 PCB Placement 10
3 Specifications 11
3.1 Electrical Specifications 11
3.1.1 Operating Conditions 11
3.1.2 Maximum Ratings 11
3.1.3 ESD Sensitivity 11
4 Connector Description 12
4.1 Extension Connector X1 12
4.2 Extension Connector X2 15
4.3 Image Sensor Connector X11 (BLT-ISM-Connector) 19
4.4 Display Connector X6 19
5 Switches, Jumpers and LEDs 21
5.1 Power LED 21
5.2 GPIO LEDs 21
5.3 GPIO Button 21
5.4 Reset Button 21
5.5 Board Configuration Switches (S2, S3) 21
5.6 Boot Mode Switch (S6) 23
5.7 UART Routing Switch (S5) 23
6 Mechanical Outline 24
6.1 Top View 24
6.2 Bottom View 25
6.3 Extender Board Footprint 26

7 Support 27
7.1 General Support 27
7.2 Board Support Packages 27
7.3 Blackfin® Software Support 27
7.3.1 BLACKSheep® OS 27
7.3.2 LabVIEW 27
7.3.3 uClinux 27
7.4 Blackfin® Design Services 27
7.4.1 Upcoming Products and Software Releases 27
8 Ordering Information 28
9 Dependability 29
9.1 MTBF 29
10 Product History 30
10.1 Version Information 30
10.2 Anomalies 30
11 Document Revision History 31
12 List of Abbreviations 32
A List of Figures and Tables 33

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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.

1 Introduction

The eDEV-BF5xx Development Board is a feature rich, low cost rapid development platform designed to decrease time-to-market of customized applications. It supports Bluetechnix' powerful Blackfin® based Core Modules like the latest eCM-BF561.

The development board provides all interfaces on dedicated connectors and has all Core Module pins routed to solder pads which can be easily accessed by the developers. This allows customers to connect their own hardware and enables comfortable measurements. Interfaces such as a high-speed serial port which is directly connectable to a computer USB port, an USB 2.0 device controller, a LAN controller and an SD-Card socket are available.

The eDEV-BF5xx supports the latest debugging interface from Analog Devices - ADI-SADA (Analog Devices Stand Alone Debug Agent) which is fully compatible with Visual DSP++ and allows programming and debugging any of the Blackfin® processors. Of course the development board is compatible with your ADI High Performance Debug Agent.

The eDEV-BF5xx features the latest extender socket (bottom side) for upcoming extender boards.

1.1 Overview

Figure 1-1 shows the main parts of the Development Board.

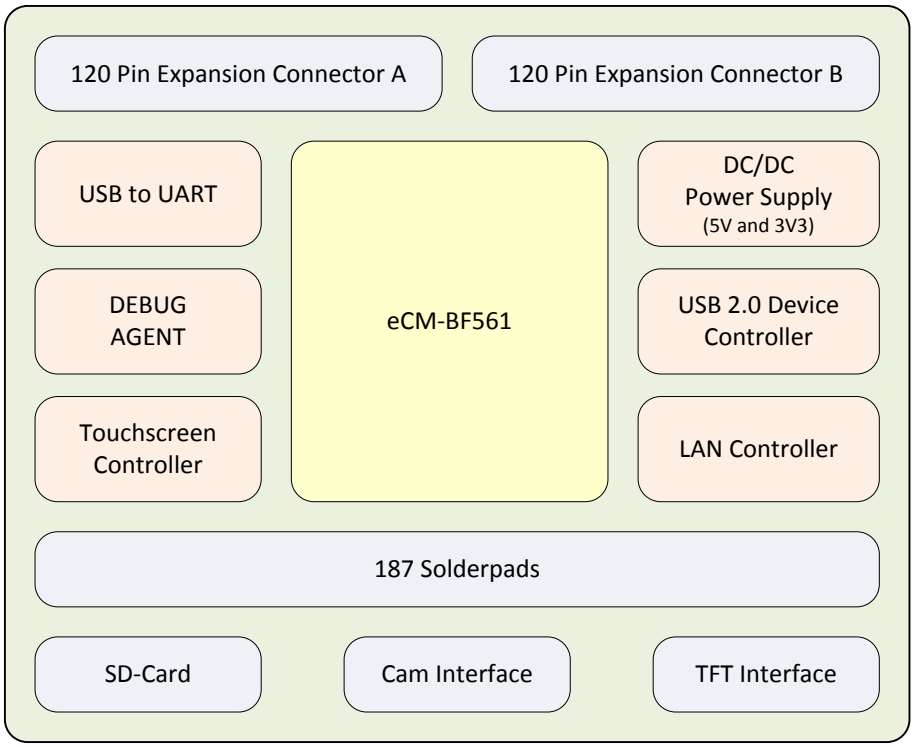


Figure 1-1: Main components of eDEV-BF5xx

1.2 Key Features

- **eCM-BF561 Core Module Slot**
  - Mating with eCMBF561 Core Module
  - Two mounting holes allow fixing the Core Module with two M2 screws
- **USB to UART converter**
  - SiLabs CP2102 USB to UART Bridge
  - Mini USB-B Connector
- **USB 2.0 Device Controller**
  - PLX Technology NET2272 USB Device Controller
  - Mini USB-B Connector
- **Ethernet Controller**
  - SMSC LAN9218 Ethernet Controller
  - RJ45 Connector with 2 LEDs
  - 93C46B/SN EEPROM for MAC storage
- **Power Supplies**
  - DC-Plug
  - 3.3V switching supply for all Devices except SADA (max. 2A)
  - 5.0V switching supply for SADA (max. 0.5A)
  - Programmable LDO1 (default 1.8V) core voltage supply for Image Sensor (max. 300mA)
  - Programmable LDO2 (default 2.85V) analog and IO voltage for Image Sensor (max. 300mA)
- **Touch Screen Controller**
  - Texas Instruments TSC2003
  - I²C interface
- **TFT Connector**
  - 40 pin ZIF connector
  - Various EDT displays available (3,5” to 7”; 320x240 to 800x480)
- **Camera Connector (BLT-ISM-Connector)**
  - 30 pin ZIF connector
  - Compatible with all Bluetechnix Image Sensor Modules
- **SD-Card Slot**
  - Compatible with SD HC-Cards
  - SPI interface
- **2x 120 Pin Extension Connector**
  - 2x Samtec QSH-060-01-L-D-A
  - All eCM Pins and additional power pins available
- **187 Solder Pads**
  - All eCM Pins and available
  - 2.45mm (0.1”) pitch spacing to solder standard headers or sockets for testing own hardware
- **LEDs**
  - 1 power LED
  - LEDs (red and green) on GPIOs
- **Button**
  - RESET Button
  - 1 Button on GPIO

1.3 Applications

- Parallel digital signal processing
- Imaging and consumer multimedia
- Set top boxes
- Automotive vision systems
- Portable media players
- Digital video camera systems
- Video Conference Applications
- Image recognition
- Video streaming application

2 General Description

The eDEV-BF5xx is a powerful evaluation platform designed for the latest Blackfin based Core Modules of Bluetechnix. It features a connector slot for a Core Module and offers wide spread connectivity possibilities.

The USB and Ethernet controllers are connected to the Blackfins EBI (External Bus Interface).

An interface for the Bluetechnix' Image Sensor Modules (ISM) as well as a TFT connector is on board. The image sensors are routed to PPI0.

The TFT connector operates with TFT displays from EDT with the standard family-concept interface. It is routed to the PPI1 of the Core Module. An additional touch screen controller is connected to GPIOs.

A JTAG connector is available to connect your high speed JTAG from Analog Devices or the ADI-SADA (Analog Devices Stand Alone Debug Agent).

The SD-Card socket is routed to the SPI port of the Core Module.

The eDEV-BF5xx has all Core Module pins routed to solder pads in order to ensure a good connectivity of external hardware.

2.1 Functional Description

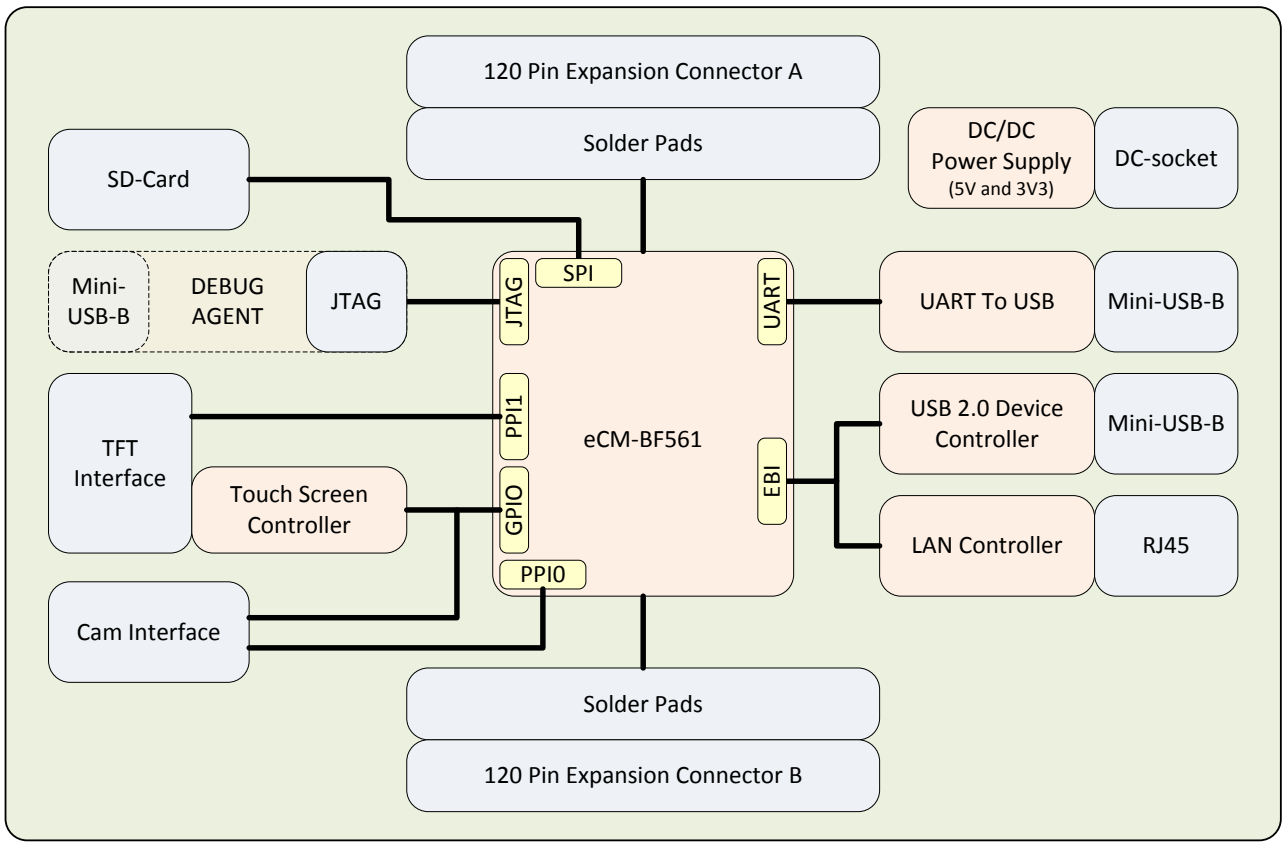


Figure 2-1: Interconnection diagram

2.1.1 Powering

The eDEV-BF5xx must be powered externally by connecting a DC source to the DC-plug. The Voltage can vary between 7V and 24V.

The on-board regulators are generating the 5.0V supply for the SADA and the 3.3V supply for the Core Module and all other devices.

2.1.2 Data Line Buffering

To guarantee that devices externally connected to the EBI are working without any problems, line buffers are connected to the 32-bit data bus. For buffering the 74LVT16245MTD with 3-state outputs is used.

2.1.3 USB

There are two USB connectors on the development board. One is connected to an UART to USB converter (X8), the second to the USB 2.0 Device controller (X7).

The CP2102 USB to UART Bridge from Silicon Labs is connected to the UART0 of the Blackfin. This USB connection is easy to use and ideal for debug outputs on the PC. The needed Drivers are available on the manufacturer's website: http://www.silabs.com/products/mcu/Pages/USBtoUARTBridgeVCPDrivers.aspx.

The UART is also available on a standard 4-pin 2.54mm pitch header. To change the UART routing the right switcher setting (S5) has to be made.

The NET2272 USB Device controller from PLX Technology is connected to the EBI. If the Controller won't be used, he can be disabled by setting the right configuration on the DIP-Switches (see chapter 5.5). The NET2272 is USB V2.0 compliant and provides a high speed USB connection to a USB Host.

2.1.4 Ethernet

The LAN9218 is a 10/100 Base-T Ethernet Controller from SMSC with integrated MAC and PHY. The controller is fully IEEE 802.3/802.3u compliant; the PHY supports HP-Auto-MDIX.

2.1.5 SD-Card

The SD-Card slot is located on the bottom side of the board. The cards are connected via SPI to the Blackfin, a 4-bit parallel data transmission mode is not supported.

2.1.6 Image Sensors (BLT-ISM-Connector)

The 30-pin ZIF socket allows connecting Image Sensor Modules (ISM) from Bluetechnix. The ISM is connected to the PPI0 of the Core Module. There are a various number of ISMs available. Please check out our website for an actual list of available modules.

2.1.7 RGB-TFT Display

Another ZIF socket (40-pin) is allows connecting a TFT-Display to the PPI1 of the Core Module. The connector is compatible with different TFT Displays from EDT (Emerging Display Technologies). Contact Bluetechnix for a list of currently supported displays.

There is also a touch screen controller on board (TCS2003) accessible via I²C.

2.2 PCB Placement

Figure 2-2 shows the position of the connectors, switches and LEDs on the board.

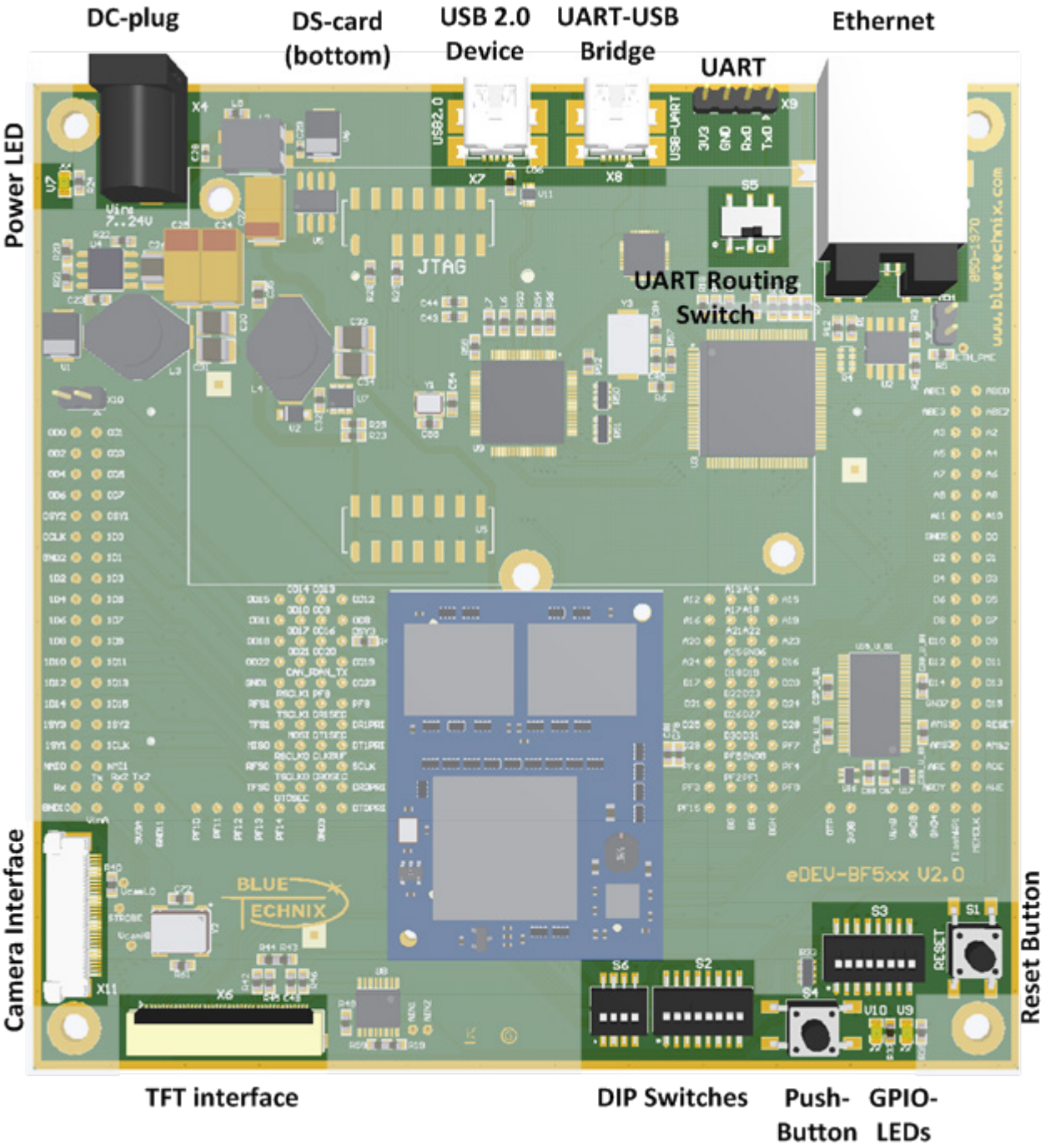


Figure 2-2: Interface overview

3 Specifications

3.1 Electrical Specifications

3.1.1 Operating Conditions

Symbol	Parameter	Min	Typical	Max	Unit
V_{IN}	Input supply voltage	7		24	V
I_{3V3}	3.3V current		TBD		A
I_{5V0} [1)]	5.0V current		TBD		A
V_{RTC} [2)]	Real-time clock supply voltage	TBD		TBD	V
I_{RTC} [2)]	VRTC current		TBD		µA

Table 3.1: Electrical characteristics

[1)] Only in ADI-SADA is used, otherwise the 5.5V is unloaded.

[2)] The eCM-BF561 has no RTC. This power supply is reserved for future use.

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	-0.5	24	V
T_{AMB}	Ambient temperature	0	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

4.1 Extension Connector X1

Pin	Name	Type	Alternative Function	Description
1	GND	PWR		Power Ground
2	GND	PWR		Power Ground
3	PPI0.D8	I/O	PF40	Parallel Peripheral Interface 0 Data
4	PPI0.D0	I/O		Parallel Peripheral Interface 0 Data
5	PPI0.D9	I/O	PF41	Parallel Peripheral Interface 0 Data
6	PPI0.D1	I/O		Parallel Peripheral Interface 0 Data
7	PPI0.D10	I/O	PF42	Parallel Peripheral Interface 0 Data
8	PPI0.D2	I/O		Parallel Peripheral Interface 0 Data
9	PPI0.D11	I/O	PF43	Parallel Peripheral Interface 0 Data
10	PPI0.D3	I/O		Parallel Peripheral Interface 0 Data
11	PPI0.D12	I/O	PF44	Parallel Peripheral Interface 0 Data
12	PPI0.D4	I/O		Parallel Peripheral Interface 0 Data
13	PPI0.D13	I/O	PF45	Parallel Peripheral Interface 0 Data
14	PPI0.D5	I/O		Parallel Peripheral Interface 0 Data
15	PPI0.D14	I/O	PF46	Parallel Peripheral Interface 0 Data
16	PPI0.D6	I/O		Parallel Peripheral Interface 0 Data
17	PPI0.D15	I/O	PF47	Parallel Peripheral Interface 0 Data
18	PPI0.D7	I/O		Parallel Peripheral Interface 0 Data
19	PPI0.SY3	I/O		Parallel Peripheral Interface 0 Sync 3
20	PPI0.SY2	I/O	TMR9	Parallel Peripheral Interface 0 Sync 2
21	GND	PWR		Power Ground
22	PPI0.SY1	I/O	TMR8	Parallel Peripheral Interface 0 Sync 1
23	PPIXD16	-		RFU
24	PPI0.CLK	I		Clock Input for Parallel Peripheral Interface 0
25	PPIXD17	-		RFU
26	GND	PWR		Power Ground
27	PPIXD18	-		RFU
28	PPI1.D0	I/O		Parallel Peripheral Interface 1 Data
29	PPIXD19	-		RFU
30	PPI1.D1	I/O		Parallel Peripheral Interface 1 Data
31	PPIXD20	-		RFU
32	PPI1.D2	I/O		Parallel Peripheral Interface 1 Data
33	PPIXD21	-		RFU
34	PPI1.D3	I/O		Parallel Peripheral Interface 1 Data
35	PPIXD22	-		RFU
36	PPI1.D4	I/O		Parallel Peripheral Interface 1 Data
37	PPIXD23	-		RFU
38	PPI1.D5	I/O		Parallel Peripheral Interface 1 Data
39	GND	PWR		Power Ground

Pin	Name	Type	Alternative Function	Description
40	PPI1.D6	I/O		Parallel Peripheral Interface 1 Data
41	CAN_TX	-		RFU
42	PPI1.D7	I/O		Parallel Peripheral Interface 1 Data
43	CAN_RX	-		RFU
44	PPI1.D8	I/O	PF32	Parallel Peripheral Interface 1 Data
45	PF9	I/O		GPIO
46	PPI1.D9	I/O	PF33	Parallel Peripheral Interface 1 Data
47	PF8	I/O		GPIO
48	PPI1.D10	I/O	PF34	Parallel Peripheral Interface 1 Data
49	GND	PWR		Power Ground
50	PPI1.D11	I/O	PF35	Parallel Peripheral Interface 1 Data
51	SP1.RSCLK	I/O	PF30	Serial Port 1 Receive Clock
52	PPI1.D12	I/O	PF36	Parallel Peripheral Interface 1 Data
53	SP1.RFS	I/O	PF24	Serial Port 1 Receive Frame Sync
54	PPI1.D13	I/O	PF37	Parallel Peripheral Interface 1 Data
55	SP1.DRPRI	I		Serial Port 1 Primary Data Receive
56	PPI1.D14	I/O	PF38	Parallel Peripheral Interface 1 Data
57	SP1.DRSEC	I	PF25	Serial Port 1 Secondary Data Receive
58	PPI1.D15	I/O	PF39	Parallel Peripheral Interface 1 Data
59	GND	PWR		Power Ground
60	GND	PWR		Power Ground
61	GND	PWR		Power Ground
62	GND	PWR		Power Ground
63	SP1.TSCLK	I/O	PF31	Serial Port 1 Transmit Clock
64	PPI1.SY3	I/O		Parallel Peripheral Interface 1 Sync 3
65	SP1.TFS	I/O	PF21	Serial Port 1 Transmit Frame Sync
66	PPI1.SY2	I/O	TMR11	Parallel Peripheral Interface 1 Sync 2
67	SP1.DTPRI	O	PF23	Serial Port 1 Primary Data Transmit
68	PPI1.SY1	I/O	TMR10	Parallel Peripheral Interface 1 Sync 1
69	SP1.DTSEC	O	PF22	Serial Port 1 Secondary Data Transmit
70	PPI1.CLK	I		Clock Input for Parallel Peripheral Interface 1
71	SPI.MOSI	O		Serial Peripheral Interface Data Output
72	3V3	PWR		3.3V Power Supply
73	SPI.MISO	I		Serial Peripheral Interface Data Input
74	3V3	PWR		3.3V Power Supply
75	SPI.SCK	O		Serial Peripheral Interface Clock
76	3V3	PWR		3.3V Power Supply
77	GND	PWR		Power Ground
78	GND	PWR		Power Ground
79	CLKBUF	O		Buffered Blackfin Master Clock Output
80	GND	PWR		Power Ground
81	GND	PWR		Power Ground
82	GND	PWR		Power Ground

Pin	Name	Type	Alternative Function	Description
83	SP0.RSCLK	I/O	PF28	Serial Port 0 Receive Clock
84	NNMI0	I		Non Maskable Interrupt for Core 0
85	SP0.RFS	I/O	PF19	Serial Port 0 Receive Frame Sync
86	NNMI1	I		Non Maskable Interrupt for Core 1
87	SP0.DRPRI	I		Serial Port 0 Primary Data Receive
88	UART.RX	I/O	PF27	UART1 Receive Data
89	SP0.DRSEC	I	PF20	Serial Port 0 Secondary Data Receive
90	UART.TX	I/O	PF26	UART1 Transmit Data
91	SP0.TSCLK	I/O	PF29	Serial Port 0 Transmit Clock
92	GND	PWR		Power Ground
93	SP0.TFS	I/O	PF16	Serial Port 0 Transmit Frame Sync
94	NC	-		Not Connected
95	SP0.DTPRI	O	PF18	Serial Port 0 Primary Data Transmit
96	UART2.RX	-		RFU
97	SP0.DTSEC	O	PF17	Serial Port 0 Secondary Data Transmit
98	UART2.TX	-		RFU
99	PF14	I/O		GPIO
100	NC	-		Not Connected
101	PF13	I/O		GPIO
102	NC	-		Not Connected
103	PF12	I/O		GPIO
104	GND	PWR		Power Ground
105	PF11	I/O		GPIO
106	GND	PWR		Power Ground
107	PF10	I/O		GPIO
108	GND	PWR		Power Ground
109	GND	PWR		Power Ground
110	NC	-		Not Connected
111	GND	PWR		Power Ground
112	NC	-		Not Connected
113	GND	PWR		Power Ground
114	NC	-		Not Connected
115	3V3	PWR		3.3V Power Supply
116	VIN	PWR		Input Voltage from DC Connector
117	3V3	PWR		3.3V Power Supply
118	VIN	PWR		Input Voltage from DC Connector
119	3V3	PWR		3.3V Power Supply
120	VIN	PWR		Input Voltage from DC Connector
S1	GND	SHIELD		Shield Ground
S2	GND	SHIELD		Shield Ground
S3	GND	SHIELD		Shield Ground
S4	GND	SHIELD		Shield Ground
S5	GND	SHIELD		Shield Ground

Pin	Name	Type	Alternative Function	Description
S6	GND	SHIELD		Shield Ground
S7	GND	SHIELD		Shield Ground
S8	GND	SHIELD		Shield Ground

Table 4-1 - Connector Description X1

4.2 Extension Connector X2

Pin	Name	Type	Alternative Function	Description
1	GND	PWR		Power Ground
2	GND	PWR		Power Ground
3	EBI.NABE0	O		Byte Enable 0 (Active Low)
4	A12	O		Address Bus
5	EBI.NABE1	O		Byte Enable 1 (Active Low)
6	A13	O		Address Bus
7	EBI.NABE2	O		Byte Enable 2 (Active Low)
8	A14	O		Address Bus
9	EBI.NABE3	O		Byte Enable 3 (Active Low)
10	A15	O		Address Bus
11	A2	O		Address Bus
12	A16	O		Address Bus
13	A3	O		Address Bus
14	A17	O		Address Bus
15	A4	O		Address Bus
16	A18	O		Address Bus
17	A5	O		Address Bus
18	A19	O		Address Bus
19	A6	O		Address Bus
20	A20	O		Address Bus
21	A7	O		Address Bus
22	A21	O		Address Bus
23	A8	O		Address Bus
24	A22	O		Address Bus
25	A9	O		Address Bus
26	A23	O		Address Bus
27	A10	O		Address Bus
28	A24	O		Address Bus
29	A11	O		Address Bus
30	A25	O		Address Bus
31	GND	PWR		Power Ground
32	GND	PWR		Power Ground
33	GND	PWR		Power Ground
34	GND	PWR		Power Ground

Pin	Name	Type	Alternative Function	Description
35	GND	PWR		Power Ground
36	GND	PWR		Power Ground
37	3V3	PWR		3.3V Power Supply
38	3V3	PWR		3.3V Power Supply
39	3V3	PWR		3.3V Power Supply
40	3V3	PWR		3.3V Power Supply
41	3V3	PWR		3.3V Power Supply
42	3V3	PWR		3.3V Power Supply
43	D0	I/O		Data Bus
44	D16	I/O		Data Bus
45	D1	I/O		Data Bus
46	D17	I/O		Data Bus
47	D2	I/O		Data Bus
48	D18	I/O		Data Bus
49	D3	I/O		Data Bus
50	D19	I/O		Data Bus
51	D4	I/O		Data Bus
52	D20	I/O		Data Bus
53	D5	I/O		Data Bus
54	D21	I/O		Data Bus
55	D6	I/O		Data Bus
56	D22	I/O		Data Bus
57	D7	I/O		Data Bus
58	D23	I/O		Data Bus
59	GND	PWR		Power Ground
60	GND	PWR		Power Ground
61	GND	PWR		Power Ground
62	GND	PWR		Power Ground
63	D8	I/O		Data Bus
64	D24	I/O		Data Bus
65	D9	I/O		Data Bus
66	D25	I/O		Data Bus
67	D10	I/O		Data Bus
68	D26	I/O		Data Bus
69	D11	I/O		Data Bus
70	D27	I/O		Data Bus
71	D12	I/O		Data Bus
72	D28	I/O		Data Bus
73	D13	I/O		Data Bus
74	D29	I/O		Data Bus
75	D14	I/O		Data Bus
76	D30	I/O		Data Bus
77	D15	I/O		Data Bus

Pin	Name	Type	Alternative Function	Description
78	D31	I/O		Data Bus
79	NC	-		Not Connected
80	PF7	I/O	SPISEL7 / TMR7	GPIO
81	NRESET	I/O		Power On Reset and Reset Input
82	PF6	I/O	SPISEL6 / TMR6	GPIO
83	NC	-		Not Connected
84	PF5	I/O	SPISEL5 / TMR5	GPIO
85	EBI.NAMS1	O		Asynchronous Memory Select 1 (Active Low)
86	PF4	I/O	SPISEL4 / TMR4	GPIO
87	EBI.NAMS2	O		Asynchronous Memory Select 2 (Active Low)
88	PF3	I/O	SPISEL3 / TMR3	GPIO
89	EBI.NAMS3	O		Asynchronous Memory Select 3 (Active Low)
90	PF2	I/O	SPISEL2 / TMR2	GPIO
91	EBI.NAOE	O		Asynchronous Memory Output Enable (Active Low)
92	PF1	I/O	SPISEL1 / TMR1	GPIO
93	EBI.NARE	O		Asynchronous Memory Read Enable (Active Low)
94	PF0	I/O	SPISS / TMR0	GPIO
95	EBI.NAWE	O		Asynchronous Memory Write Enable (Active Low)
96	PF15	I/O	EXTCLK	GPIO
97	ARDY	I		Address Ready
98	GND	PWR		Power Ground
99	GND	PWR		Power Ground
100	NBG	I/O		Bus Grant (Active Low)
101	EBI.SCLK	O		Synchronous Memory Clock
102	NBR	I		Bus Request (Active Low)
103	GND	PWR		Power Ground
104	NBGH	I/O		Bus Grant Hang (Active Low)
105	GND	PWR		Power Ground
106	RFU0	-		RFU
107	GND	PWR		Power Ground
108	OTP	-		RFU
109	NC	-		Not Connected
110	GND	PWR		Power Ground
111	NC	-		Not Connected
112	GND	PWR		Power Ground
113	NC	-		Not Connected
114	GND	PWR		Power Ground
115	VIN	PWR		Input Voltage from DC Connector
116	3V3	PWR		3.3V Power Supply
117	VIN	PWR		Input Voltage from DC Connector
118	3V3	PWR		3.3V Power Supply
119	VIN	PWR		Input Voltage from DC Connector
120	3V3	PWR		3.3V Power Supply

Pin	Name	Type	Alternative Function	Description
S1	GND	SHIELD		Shield Ground
S2	GND	SHIELD		Shield Ground
S3	GND	SHIELD		Shield Ground
S4	GND	SHIELD		Shield Ground
S5	GND	SHIELD		Shield Ground
S6	GND	SHIELD		Shield Ground
S7	GND	SHIELD		Shield Ground
S8	GND	PWR		Shield Ground

Table 4-2 - Connector description X2

4.3 Image Sensor Connector X11 (BLT-ISM-Connector)

Pin	Name	Type	Description
1	VDD	PWR	Power Supply
2	GND	PWR	Power Ground
3	SADDR	I	Configuration Bus Address
4	EXTCLK	I	Mount Option instead of onboard oscillator
5	nRESET	I	Reset (active low)
6	SCL	O	Configuration Bus Clock Line
7	SDA	I/O	Configuration Bus Data Line
8	RFU		
9	GND	PWR	Power Ground
10	PIXCLK	O	Pixel Clock
11	FV	O	Frame Valid (VSYNC)
12	LV	O	Line Valid (HSYNC)
13	TRIGGER	I	Camera Trigger
14	STROBE	O	Strobe Signal
15	D0	O	Pixel Data0
16	D1	O	Pixel Data1
17	D2	O	Pixel Data2
18	D3	O	Pixel Data3
19	VDDIO	PWR	I/O supply voltage
20	GND	PWR	Power Ground
21	D4	O	Pixel Data4
22	D5	O	Pixel Data5
23	D6	O	Pixel Data6
24	D7	O	Pixel Data7
25	GND	PWR	Power Ground
26	D8	O	Pixel Data8
27	D9	O	Pixel Data9
28	D10	O	Pixel Data10
29	D11	O	Pixel Data11
30	nOE	I	Output Enable (active low)

Table 4-3: BLT-ISM-Connector interface description (X11)

4.4 Display Connector X6

Pin	Name	Type	Description
1	PF14	O	Display Reset (shorted with pin 29)
2	GND	PWR	Power Ground
3	PPI1.D15	O	Red Data (MSB)
4	PPI1.D14	O	Red Data
5	PPI1.D13	O	Red Data
6	PPI1.D12	O	Red Data

Pin	Name	Type	Description
7	PPI1.D11	O	Red Data
8	PPI1.D15	O	Red Data (LSB)
9	GND	PWR	Power Ground
10	PPI1.D10	O	Green Data (MSB)
11	PPI1.D9	O	Green Data
12	PPI1.D8	O	Green Data
13	PPI1.D7	O	Green Data
14	PPI1.D6	O	Green Data
15	PPI1.D5	O	Green Data (LSB)
16	GND	PWR	Power Ground
17	PPI1.D4	O	Blue Data (MSB)
18	PPI1.D3	O	Blue Data
19	PPI1.D2	O	Blue Data
20	PPI1.D1	O	Blue Data
21	PPI1.D0	O	Blue Data
22	PPI1.D4	O	Blue Data (LSB)
23	GND	PWR	Power Ground
24	PPI1.CLK	O	Display Data Clock
25	GND	PWR	Power Ground
26	PPI1.SY1	O	HSYNC
27	PPI1.SY2	O	VSYNC
28	PPI1.SY3	O	Data Enable
29	PF14	O	Power Control (shorted with pin 1)
30	3V3	PWR	3.3V Power Supply
31	GND	PWR	Power Ground
32	GND	PWR	Power Ground
33	3V3	PWR	3.3V Power Supply
34	3V3	PWR	3.3V Power Supply
35	NC	-	Not Connected
36	PF5/TMR5	O	PWM for Backlight Dimming
37	TP_Y+	AI	Analog touch screen Input
38	TP_X-	AI	Analog touch screen Input
39	TP_Y-	AI	Analog touch screen Input
40	TP_X+	AI	Analog touch screen Input

Table 4-4: Display interface description (X6)

5 Switches, Jumpers and LEDs

5.1 Power LED

The Power LED right next to the DC-plug indicates whether the Core Module is powered or not. The LED goes on, if the 3.3V power supply is generates.

5.2 GPIO LEDs

Each of the two LEDs (red and green) is connected via a DIP switch (see below) to a GPIO of the Core Module.

LED	Color	Blackfin GPIO
V9	Red	PF6
V10	Green	PF7

Table 5-1: LED connection description

5.3 GPIO Button

One push-button is connected to the GPIO **PF10**. Also this button (and the pull-up resistor) can be disconnected from the module. A hardware de-bouncing is realized by a single RC-element with a time-constant of τ=1ms.

5.4 Reset Button

The Reset button is connected to the Core Modules Reset and to the camera Reset on X11. He is also available on the extension connector X2. The hardware de-bounced signal (τ=5.4ms) is gated with an open collector Schmitt-trigger.

5.5 Board Configuration Switches (S2, S3)

The board configuration DIP-switches offers the user to disable or disconnect specific devices or elements on the board.

No	BF Name	Component	Signal	Description
1	PF1	Ethernet	nRESET	**OFF**: Disconnect the Ethernet reset signal nRESET from PF1; controller remains in reset state **ON**: Connect the Ethernet reset signal nRESET to PF1
2	PF11	Ethernet	IRQ	**OFF**: Disconnect the Ethernet interrupt signal IRQ from PF11 **ON**: Connect the Ethernet interrupt signal IRQ to PF11
3	nAMS1	Ethernet	nCS	**OFF**: Disconnect the Ethernet signal nCS from nAMS1, controller remains unselected **ON**: Connect the Ethernet signal nCS to nAMS1
4	nAMS2	USB	nCS	**OFF**: Disconnect the USB signal nCS from nAMS2; controller remains unselected **ON**: Connect the USB signal nCS to nAMS2
5	PF12	USB	nIRQ	**OFF**: Disconnect the USB interrupt signal nIRQ from PF12 **ON**: Connect the USB interrupt signal nIRQ to PF12

No	BF Name	Component	Signal	Description
6	PF13	USB	nRESET	**OFF**: Disconnect the USB reset signal nRESET from PF13; controller remains in reset state **ON**: Connect the USB reset signal nRESET to PF13
7	PF2	Touch screen controller	nPenIRQ	**OFF**: Disconnect the touch screen controller interrupt signal nPenIRQ from PF2 **ON**: Connect the touch screen controller interrupt signal nPenIRQ to PF2
8	PF4/TMR4	Display	CLK	**OFF**: Disconnect PPI1.CLK from PF4 **ON**: Drive the PPI1.CLK with TMR4 output

Table 5-2: DIP switch setting description for S2

No	BF Name	Component	Signal	Description
1	PF10	Push-button S4		**OFF**: Disconnect push-button S4 from PF10 **ON**: Connect push-button S4 to PF10
2	RX	UART	RX	**OFF**: Remove pull-up resistor from UART-Rx signal **ON**: Add 10k pull-up resistor to UART-RX signal
3	PF7	LED V10		**OFF**: Disconnect red LED V10 from PF7 **ON**: Connect green LED V10 to PF7
4	PF6	LED V9		**OFF**: Disconnect red LED V9 from PF6 **ON**: Connect green LED V9 to PF6
5	PF46	Camera	SIO.D	**OFF**: Disconnect camera signal SIO.D from PF46 **ON**: Connect camera signal SIO.D to PF46
6	PF47	Camera	SIO.C	**OFF**: Disconnect camera signal SIO.C from PF47 **ON**: Connect camera signal SIO.C to PF47
7	PF9	Touch screen controller	SDA	**OFF**: Disconnect the SDA signal of the touch screen controller from PF9 **ON**: Connect the SDA signal from touch screen controller to PF9
8	PF8	Touch screen controller	SCL	**OFF**: Disconnect the SCL signal of the touch screen controller from PF8 **ON**: Connect the SCL signal from touch screen controller to PF8

Table 5-3: DIP switch settings description for S3

5.6 Boot Mode Switch (S6)

To set the right Boot Mode, only the switches 1 and 2 are used. Switches 3 and 4 are reserved for future use.

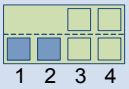
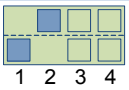
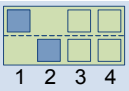
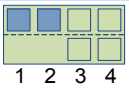
Switch Setting	Boot Description
	Execute from16Bit external memory bypass ROM
	Reserved
	Boot from 8Bit Flash
	Boot from SPI 16Bit

Table 5-4: Boot mode settings

5.7 UART Routing Switch (S5)

Switch Position	Function
0	The UART is routed to the 4-pin header
1	The UART is routed to the USB to UART bridge

Table 5-5: UART Routing switch settings

6 Mechanical Outline

6.1 Top View

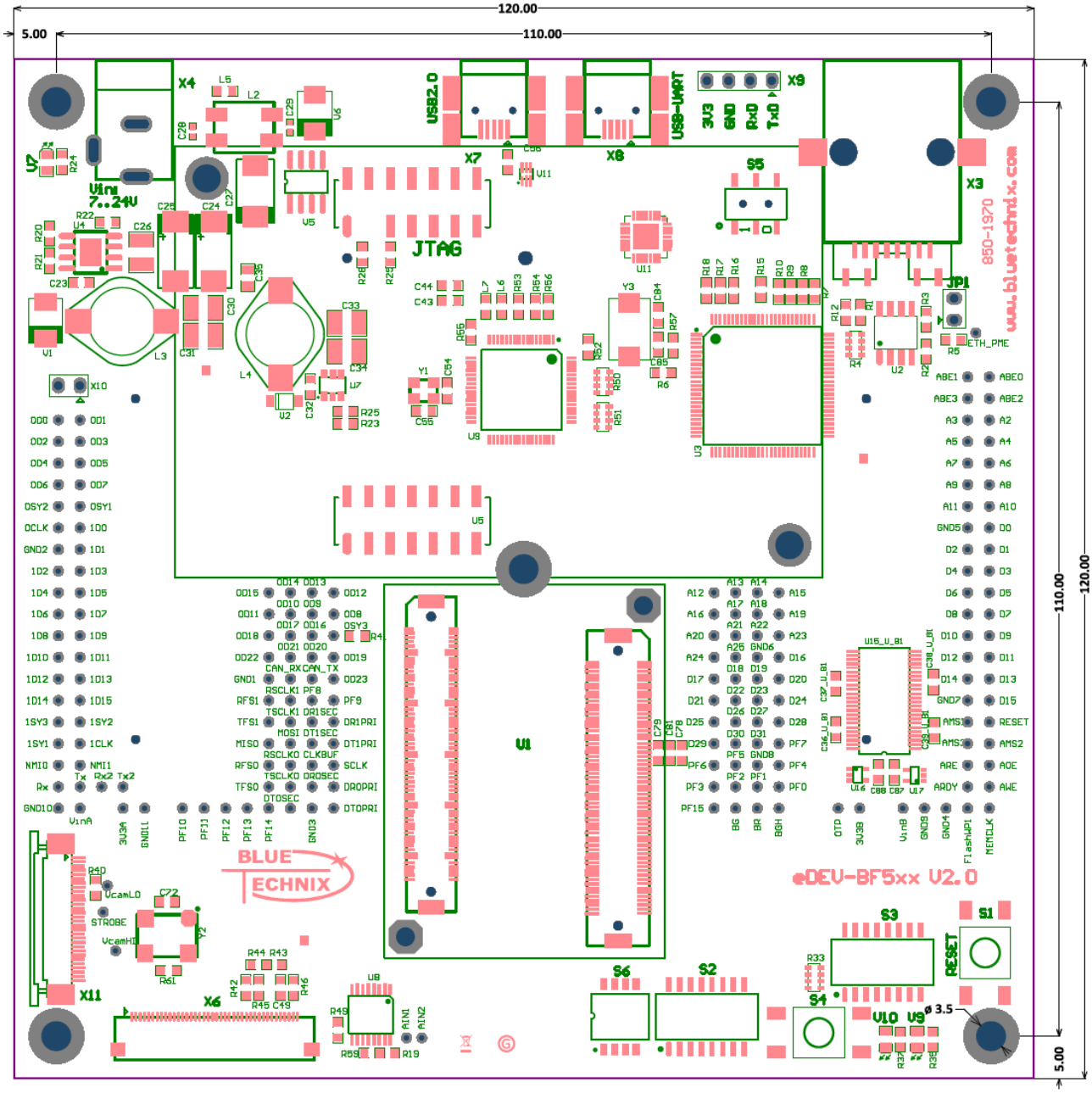


Figure 6-1: Mechanical outline top view

6.2 Bottom View

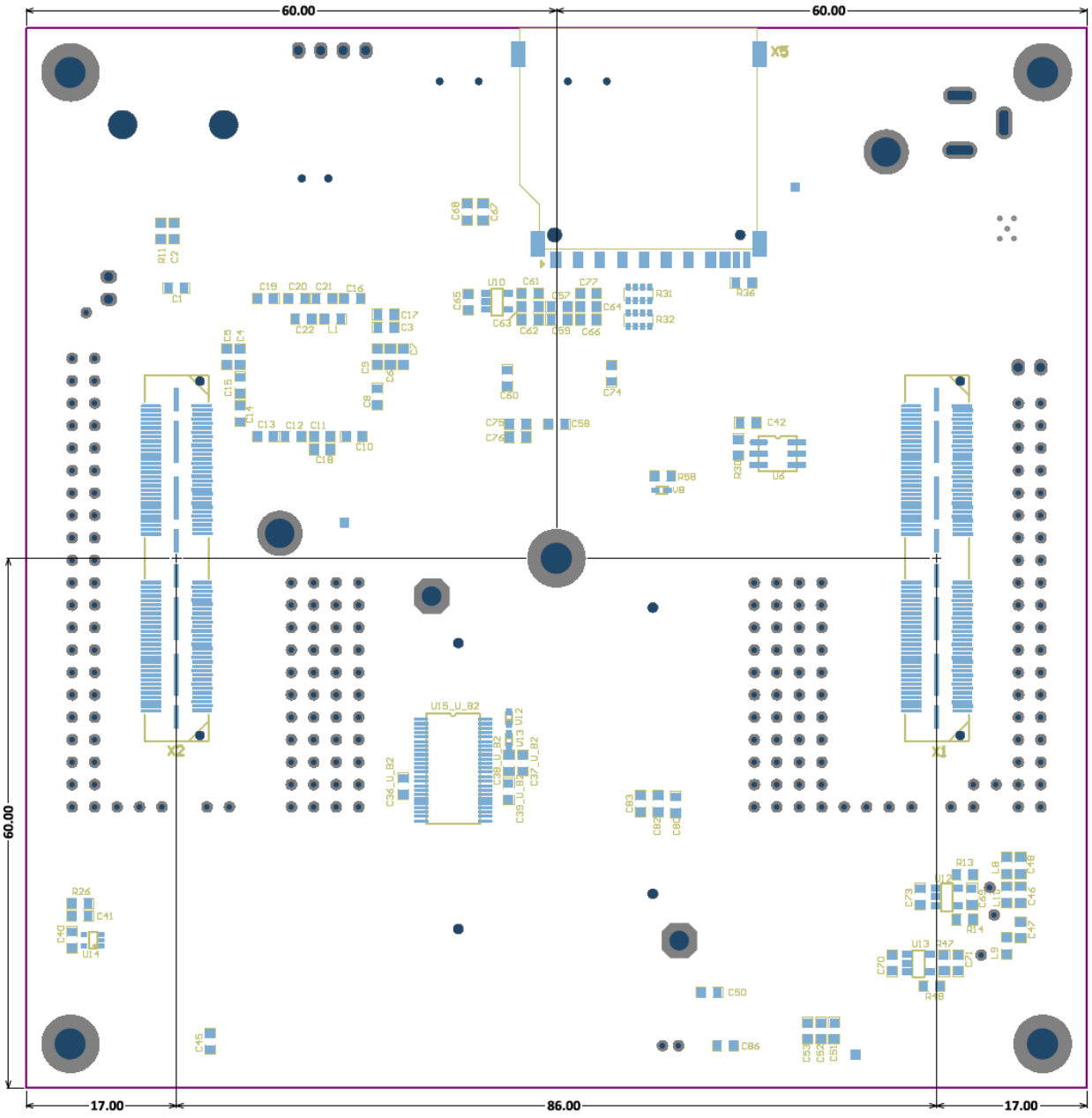


Figure 6-2: Mechanical outline bottom view

6.3 Extender Board Footprint

Figure 6-3 shows the recommended extension board layout used also for Bluetechnix extension boards. For the detailed dimensions for the extension board connectors (QTH-060-01-L-D-A from Samtec) please refer the Samtec product manual.

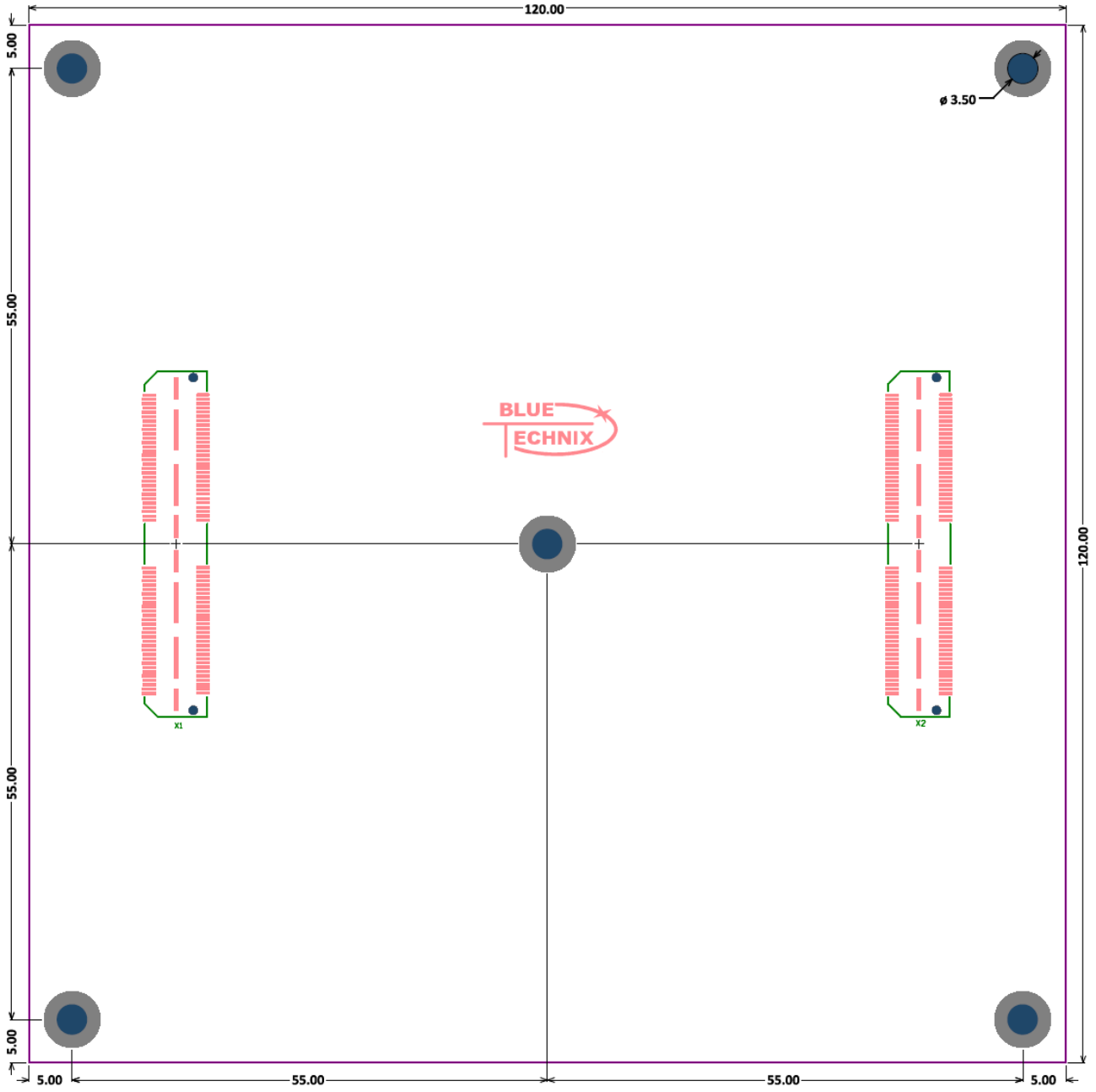


Figure 6-3: Recommended extender board layout

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

Article Number	Name	Temperature Range
100-2341-2	eDEV-BF5xx	Commercial
100-3400-1	Blackfin Evaluation Starter Package with eCM-BF561	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

Version	Component	Type
2.1	2013-06-21	Changed position of USB connectors and SD card slot Connected PF9 (instead of nReset) to ISM Reset pin
2.0	2011-03-31	New power supply for 5.0V and 3.3V Additional buffers on data lines of EBI for better signal quality
1.0	2010-12-03	First release V1.0 of the Hardware.

Table 10.1: Overview eDEV-BF5xx product changes

10.2 Anomalies

Version	Date	Description
2.1	2013-06-21	No anomalies reported yet.
2.0	2011-07-18	No anomalies reported yet.
1.0	2010-12-12	Poor signal quality on data lines of EBI

Table 10.2 – Product anomalies

11 Document Revision History

Version	Date	Document Revision
1	2013 06 21	Updated to new CI

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

Figure 1-1: Main components of eDEV-BF5xx 5
Figure 2-1: Interconnection diagram 8
Figure 2-2: Interface overview 10
Figure 6-1: Mechanical outline top view 24
Figure 6-2: Mechanical outline bottom view 25
Figure 6-3: Recommended extender board layout 26

Tables

Table 3.1: Electrical characteristics 11
Table 3.2: Absolute maximum ratings 11
Table 4-1 - Connector Description X1 15
Table 4-2 - Connector description X2 18
Table 4-3: BLT-ISM-Connector interface description (X11) 19
Table 4-4: Display interface description (X6) 20
Table 5-1: LED connection description 21
Table 5-2: DIP switch setting description for S2 22
Table 5-3: DIP switch settings description for S3 22
Table 5-4: Boot mode settings 23
Table 5-5: UART Routing switch settings 23
Table 8.1: Ordering information 28
Table 10.1: Overview eDEV-BF5xx product changes 30
Table 10.2 – Product anomalies 30
Table 11.1: Revision history 31
Table 12.1: List of abbreviations 32

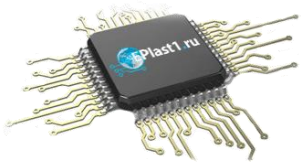
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- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



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