Hardware User Manual

SBC-i.MX51 V1.2

...maximum performance at minimum space

Contact

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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.

The Core Modules and development systems contain ESD (electrostatic discharge) sensitive devices. Electro-static charges readily accumulate on the human body and equipment and can discharge without detection. Permanent damage may occur on devices subjected to high-energy discharges. Proper ESD precautions are recommended to avoid performance degradation or loss of functionality. Unused Core Modules and Development Boards should be stored in the protective shipping

1 Overview

1.1 Features

The Single Board Computer SBC-i.MX51 is based on Freescale's high-performance i.MX51x mobile platform, incorporating an ARM Cortex A8 CPU, an Image Processing Unit (IPUv3EX) and a Video Processing Unit (VPU). The IPUv3EX provides comprehensive support for the connectivity to displays and cameras. The VPU supports hardware encoding and decoding of MPEG-4, H.263 and H.264 standards. Its memory capabilities (NAND Flash, DDR2 SDRAM) and numerous interfaces turn the SBC-i.MX51 into the ultimate development board for future high-end embedded devices comparable to netbooks. Other target applications include industrial automation and control systems. Figure 1-1 shows board's the features.
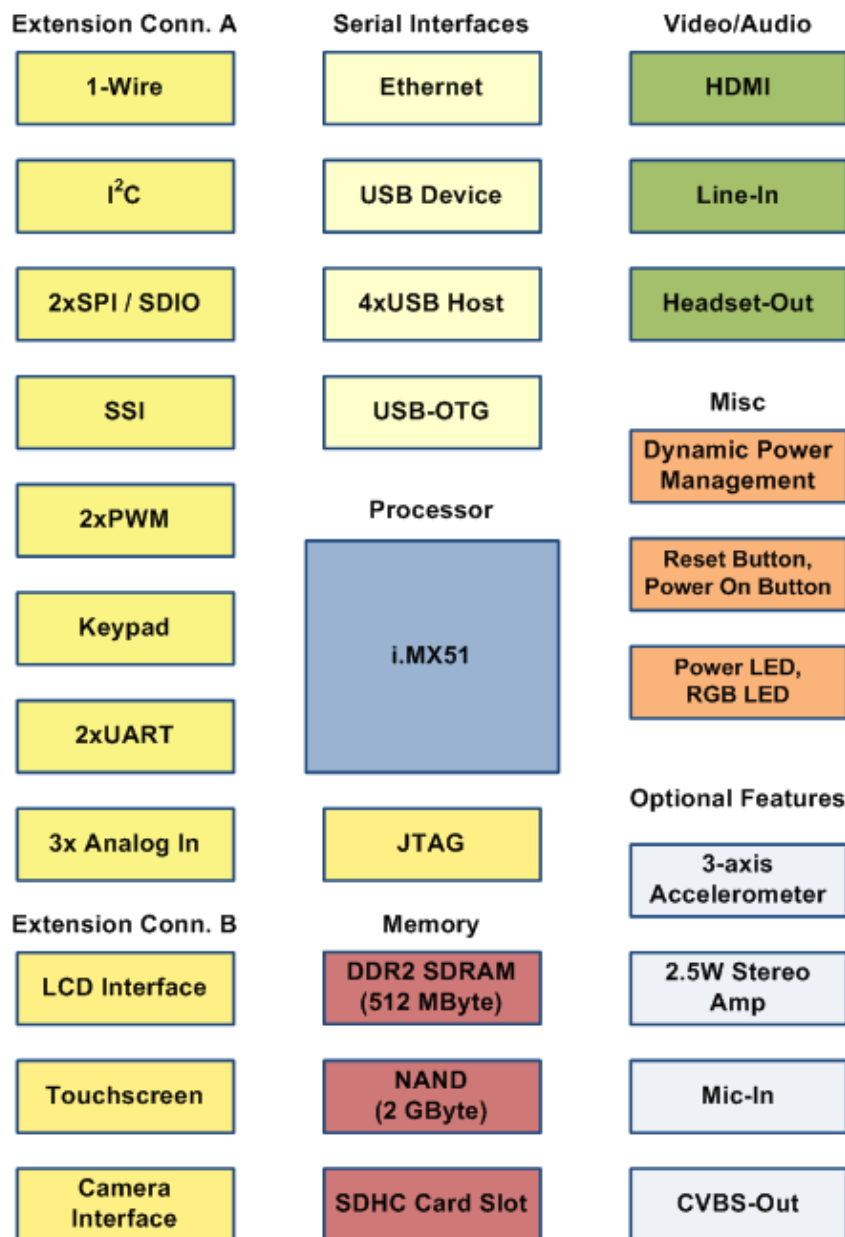
Figure 1-1: SBC-i.MX51 features

1.2   Block Diagram

Figure 1-2 shows the main components and connectors on the SBC-i.MX51.
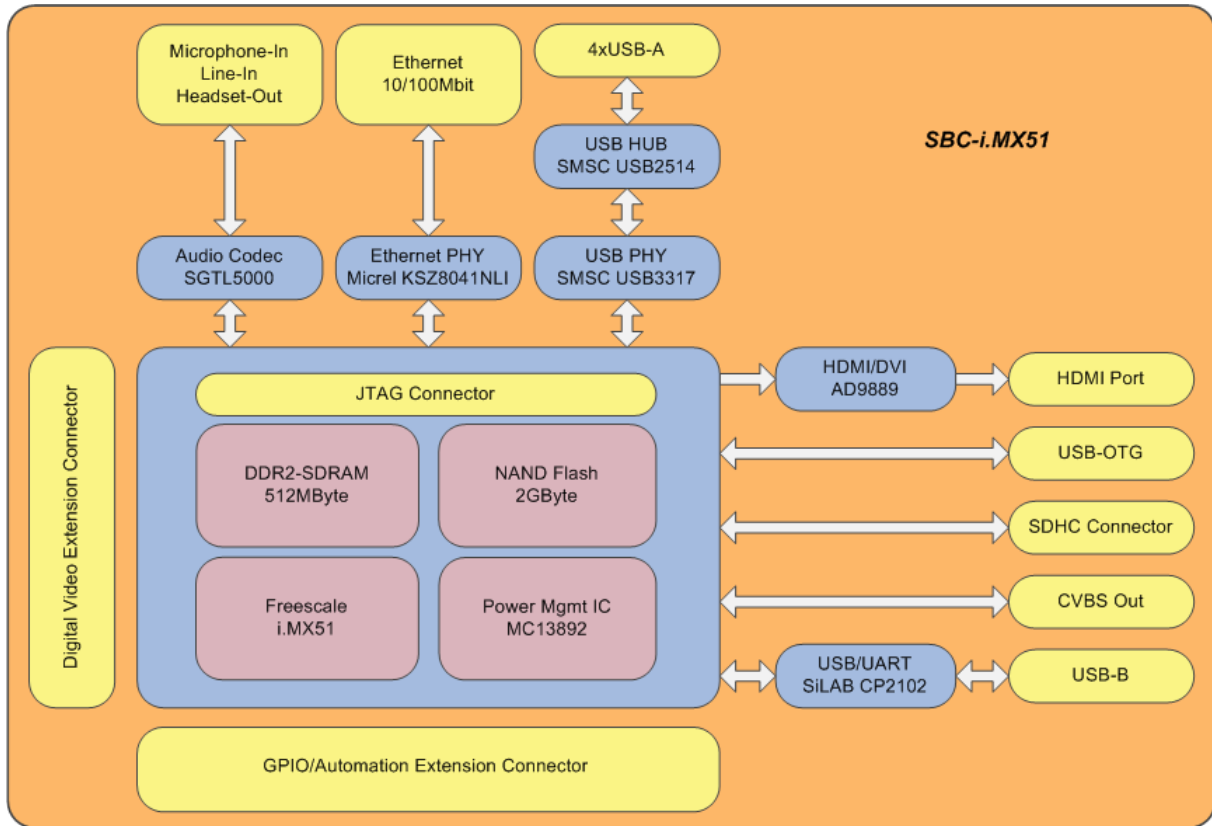
Figure 1-2: SBC-i.MX51 Overview

2   Components

The SBC-i.MX51 contains many peripherals to provide a lot of interfacing options. The next paragraphs give you a short overview of each component including a brief feature list. Please refer to the manufacturer's user manuals for more details.

2.1   Integrated Components

i.MX51 processor (Freescale, MCIMX515DJM8C)

Multimedia processor for mobile and low power application.

- ARM Cortex A8 core
- 800 MHz core clock frequency
- 200 MHz DDR2 SDRAM interface
- Dynamic power management
- Hardware video codec
- Powerful graphics acceleration (OpenGL and OpenVG)

i.MX Companion IC (Freescale, MC13892JVK)

The Power Management IC MC13892 is Freescale's companion IC for i.MX series CPUs. It generates all required power supplies, and contains some additional features:

- Dynamic power control system
- Battery charging control logic
- Octal 10-Bit ADC
- Single RGB LED driver
- Backlight LED driver
- Real Time Clock

DDR2 SDRAM (Micron, MT47H64M16HR-25 IT)

- 512 MByte
- DDR2-800 (800MB/s)

NAND Flash (Micron, MT29F16G08CBABAWP)

- 2GByte
- 8 Bit
- 4k pagesize

Ethernet Physical Transceiver (Micrel, KSZ8041)

- Ethernet/IEEE 802.3
- 10BaseT
- 100BaseTX
- MII Interface

USB Physical Transceiver (SMSC, USB3317)

- USB-IF "High-Speed" compliant (V2.0)
- ULPI interface

USB HUB (SMSC, USB2514I)

- 4 port HUB
- USB-IF "High-Speed" compliant (V2.0)
- High Speed, Full-Speed and Low-Speed compatible

USB to UART Bridge (SiLabs, CP2102)

- USB device
- Usable for terminal applications

HDMI Transmitter (Analog Devices, AD9889B)

- HDMI 1.1 compatible
- I²S and SPDIF audio encoding

Audio Codec (Freescale, SGTL5000)

- Stereo Line In
- Stereo Line Out
- Mic In (Electret or Dynamic microphones supported)

2.2 Optional Components

A few components, are not mounted in the current version of the SBC-i.MX51. If you want to use these components contact Bluetechnix for custom assembling.

These optional components are:

- 2.5W Stereo Audio Amp (National Semiconductors, 2x NCP2820)
- PCB Microphone (Knowles Acoustics, SPM0208HD5)
- 3-Axis Acceleration Sensor (Freescale, MMA7660FC)
- CVBS Connector

3   Standard I/O Connectors

There are two types of connectors on the SBC-i.MX51: standard I/O Connectors and Extension Connectors. All standard I/O Connectors (except JTAG) are accessible on the front or rear side of the board (see Figure 3-1).
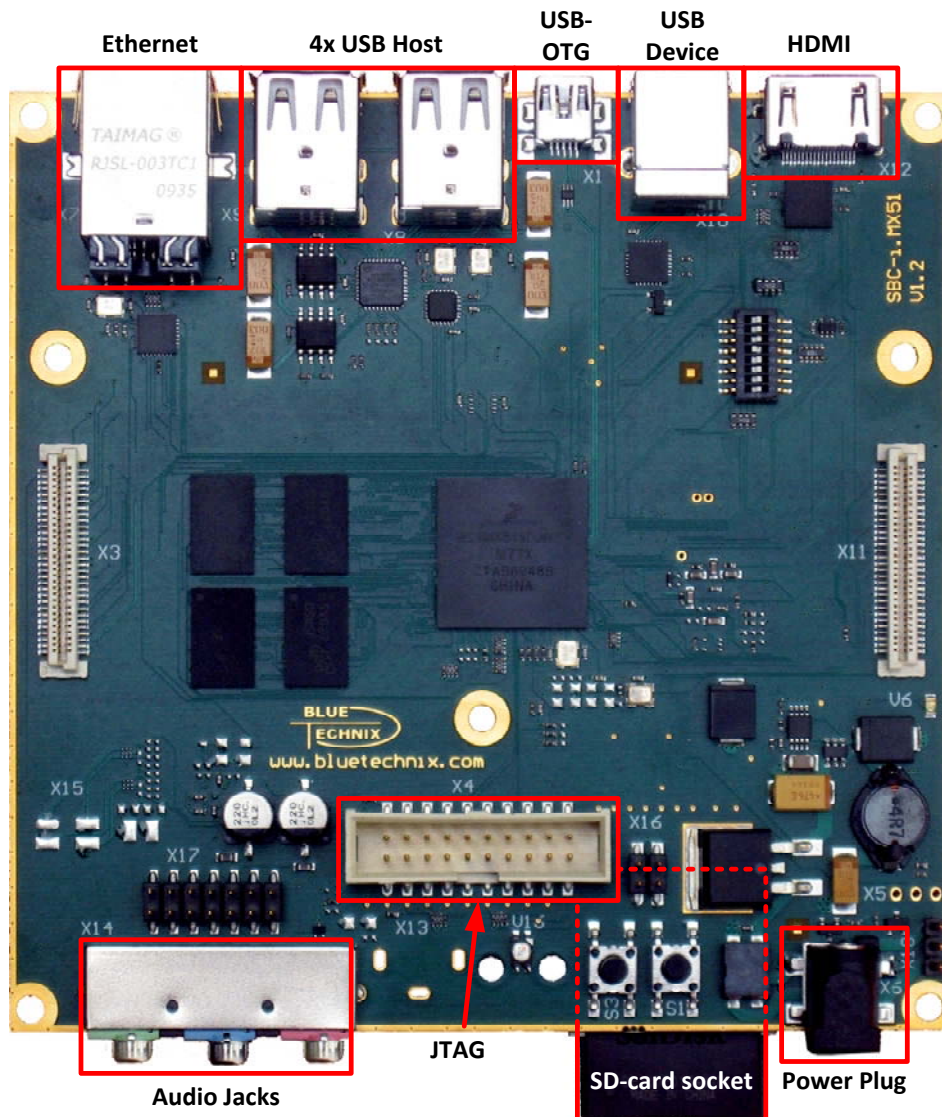
Figure 3-1: Standard Interface positions

Front side Connectors:

- Triple Audio Jack (Mic-In, Line-In and Headset-Out)
- TV out (not populated on SBC-i.MX51 V1.2)
- SD-card socket
- Power plug

Rear side Connectors:

- Ethernet
- 4x USB A (host connector)

- Mini USB AB (USB-OTG connector)
- USB-B (device connector for terminal application)
- HDMI Display output

JTAG Connector:

A standard ARM JTAG connector with 20 pins is available for debugging.

LED and Push Buttons:

There are two push buttons and a single RGB-LED for user interaction. The RGB LED is connected to the MC18392 LED interface.

The push buttons have following functions:

- S1: RESET
- S3: Power On

RGB-LED   PON   RESET
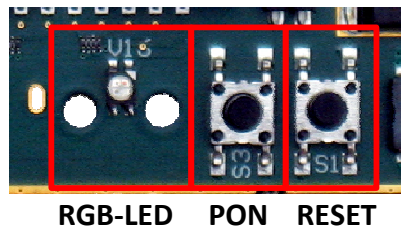
Figure 3-2: LED and button positions

If the SBC is enclosed in a chassis, you can mount a light pipe (515-1011F from DIALIGHT) above the RGB-LED for guiding the light to a front side panel.

4 Extension Connectors

The Extension Connectors allow connecting additional hardware to the SBC-i.MX51. Bluetechnix offers additional hardware for the SBC-i.MX51 such as a display extension board. See our website for more information. (http://www.bluetechnix.com/goto/sbc-i.mx51)

All connector I/O pins are either connected to the i.MX or to the MC13892 (see pin description). Most of the pins connected to the i.MX have alternate functions; for more details see the Pin Description Tables and consult the i.MX51 datasheet.

The connectors for the GPIO- and Video Extension Connectors are 5177983-2 from Tyco Electronics (mating part is 5179031-2). All other connectors are standard 2.54mm-pitch headers.
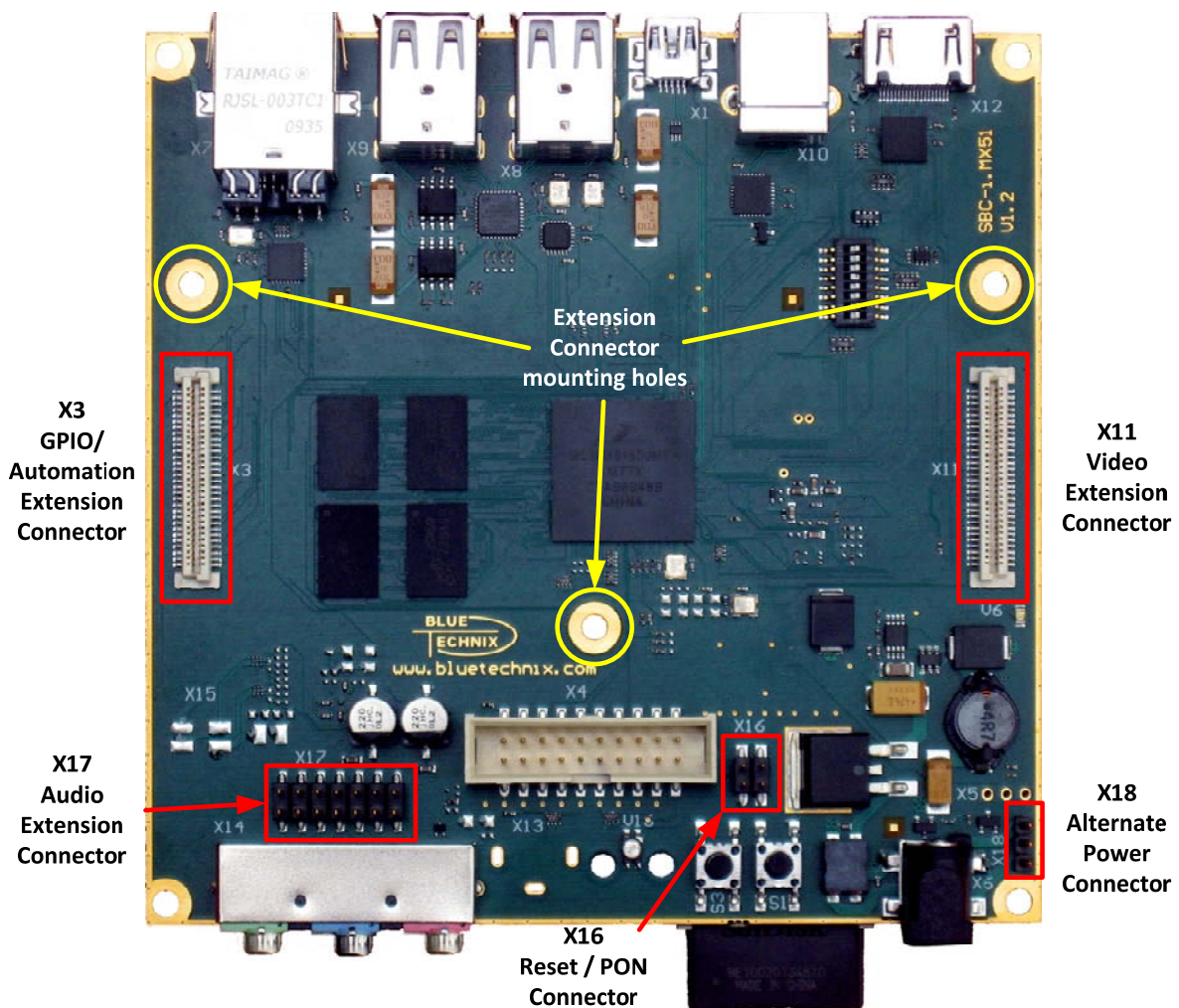
Figure 4-1: Extension Connector positions

4.1 GPIO/Automation Connector (X3)

The GPIO/Automation Extension Connector includes several serial interfaces, as well as a keypad, power-LED drivers and three analog inputs. See Figure 4-2 for a feature overview and Table 4-3 for a detailed pin description.
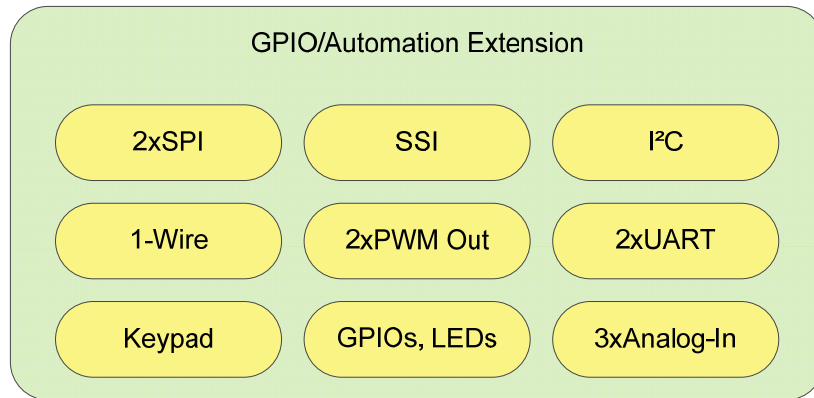
Figure 4-2: GPIO/Automation Extension Connector Interfaces

4.1.1 One-Wire-Interface

The 1-Wire interface is available to communicate with a generic 1-Wire device defined by Maxim-Dallas.

4.1.2 Analog-In

Three 10-Bit analog-digital-converters (ADC) are available for general use. The inputs are connected to ADIN[5..7] on the MC13892 companion chip.

4.1.3 I²C

The two I²C serial busses allow the attachment of a variety of peripheral components to the GPIO/Automation Connector. Note that the I²C1 is shared with the CSPI1 Serial Peripheral Interface.

4.1.4 Keypad

The connector features keypad pins to connect a six-by-four button matrix keyboard to the specially designated interface of the i.MX51.

4.1.5 LEDs

The MC13892 features an auxiliary display LED driver output and a keypad LED driver output. Yet, please refer to the Errata sheet of the MC13892 for problems which may appear when using this interface.
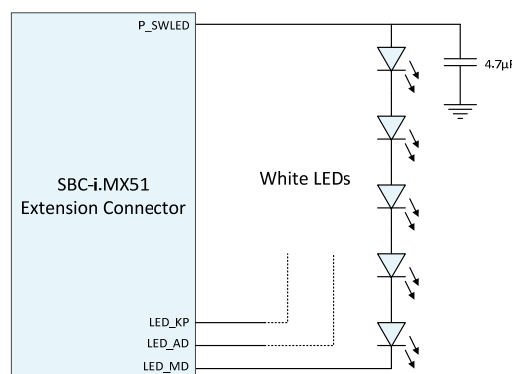
Figure 4-3: LED connection circuit

4.1.6 PWM

Two PWM outputs are available on the GPIO/Automation Extension Connector. Please note that the PWM1 is also present on the Video Extension Connector.

4.1.7 SPI

Two Serial Peripheral Interfaces are available on the connector. The CSPI1 interface is shared with the I^{2}C1 and provides two slave select signals, the CSPI is shared with the SD-card interface, and provides only a single slave select signal.

4.1.8 SSI

This interface can be used as alternate digital audio channel and is connected to the AUD4 interface of the i.MX51.

4.1.9 UART

The signals of the UART2 and UART3 are available on the extension connector for the connection of a variety of peripheral devices.

4.1.10 Power Supplies

The GPIO / Automation Extension Connector provides seven different supply voltages. They can be used on a custom extension board. Some supply voltages are generated by the MC13892 and can be set to different values. They must be set and enabled first, by configuring the companion IC. The following table shows the maximum supply current for each voltage domain.

Signal Name	Voltage	Maximum Supply Current
P_5V0	5.0V	500mA[3]
P_VIOHI[1]	2.775V	50mA[3]
P_SW4[1]	1.8V	50mA[3]
P_GEN2[1]	3.15V	70mA
P_AUDIO	2.3V, 2.5V, 2.775V, 3.0V	150mA
P_VIDEO	2.5V, 2.6V, 2.7V, 2.775V	350mA
P_SWLED[2]	4.3V to 26.5V	60mA

Table 4-1: Maximum power consumption for the GPIO / Automation Connector supplies

[1] It is not advisable to alter these voltages; otherwise the board may get damaged.
[2] The P_SWLED voltage drives the LEDs connected to the LED-driver pins. The output voltage will be set automatically by the MC13892. For LED connectivity see Figure 4-3.
[3] Be aware that this power supply is available on both extension connectors and this is the maximum current that can be drawn altogether.

4.1.11 I/O Power Domains

All digital I/O pins are part of one of three power domains: P_SW4 (1.8V), P_VIOHI (2.775V) or P_GEN2 (3.15V). The following table shows each interface with the corresponding voltage level.

Interface	Pins	Power Domain	Description
1-Wire	1	P_VIOHI	OWIRE
I^{2}C2	2	P_VIOHI	I2C1.SCL, I2C1.SDA
Keypad	10	P_SW4	KPP.COL[0..5], KPP.ROW[0..3]

Interface	Pins	Power Domain	Description
PWM	2	P_VIOHI	PWM1, PWM2
SD	6	P_GEN2	SD2.CMD, SD2.CLK, SD2.D0, SD2.D1, SD2.D2, SD2.D3
SPI	6	P_SW4	CSPI1.MOSI, CSPI1.MISO, CSPI1.SS0, CSPI1.SS1, CSPI1.RDY, CSPI1.SCLK
SSI	6	P_VIOHI	AUD4.RFS, AUD4.RSCK, AUD4.Tx, AUD4.Rx, AUD4.TSCK, AUD4.TFS
UART	4	P_VIOHI	UART2.TXD, UART2.RXD, UART3.TXD, UART3.RXD
PON	1	Open Drain	A_CTRL.PON1 – Power down Power Mgmt.
ADIN	3	-	ADC Input on MC13892
LED	2	P_SWLED	LED driver outputs

Table 4-2: Power Domains for I/Os

4.1.12 Pin Description Table

Pin No	Signal	Type	Description
1	P_SWLED	PWR	Power Supply
2	GND	PWR	Power Ground
3	LED_AD	O	LED driver output connected to MC18392
4	A_CTRL_PON1	IpU	Power On Input
5	LED_KP	O	LED driver output connected to MC18392
6	GND	PWR	Power Ground
7	GND	PWR	Power Ground
8	EIM_D27	IO	usable as I2C2_SCL or GPIO2_9
9	ADIN5	I	Analog input connected to MC18392
10	EIM_D24	IO	usable as I2C2_SDA or GPIO2_8
11	ADIN6	I	Analog input connected to MC18392
12	GND	PWR	Power Ground
13	ADIN7	I	Analog input connected to MC18392
14	OWIRE_LINE	IO	One-wire interface
15	GND	PWR	Power Ground
16	UART2_RXD	I	UART RxD or GPIO 1_20
17	P_GEN2	PWR	Power Supply
18	UART2_TXD	O	UART TxD or GPIO 1_21
19	SD2_CMD	IO	SD-card interface or CSPI_MOSI
20	UART3_RXD	I	UART RxD or GPIO 1_22
21	SD2_CLK	O	SD-card interface or CSPI_SCLK
22	UART3_TXD	I	UART TxD or GPIO 1_23
23	SD2_D0	IO	SD-card interface
24	GND	PWR	Power Ground
25	SD2_D1	IO	SD-card interface
26	GPIO1_2	IO	GPIO with PWM1 functionality
27	SD2_D2	IO	SD-card interface
28	GPIO1_3	IO	GPIO with PWM2 functionality
29	SD2_D3	IO	SD-card interface or CSPI_SS2
30	GND	PWR	Power Ground
31	GND	PWR	Power Ground
32	P_SW4	PWR	Power Supply
33	CSPI1_MOSI	IO	SPI1 usable also as I2C1_SDA (default) or GPIO4_22
34	KPP_ROW0	I	Keypad Row
35	CSPI1_MISO	I	SPI1 usable also as GPIO4_23
36	KPP_ROW1	I	Keypad Row
37	CSPI1_SS0	O	SPI1 usable also as GPIO4_24
38	KPP_ROW2	I	Keypad Row

39	CSPI1_SS1	O	SPI1 usable also as GPIO4_25
40	KPP_ROW3	I	Keypad Row
41	CSPI1_RDY	I	SPI1 usable also as GPIO4_26
42	KPP_COL0	I	Keypad Column
43	CSPI1_SCLK	IO	SPI1 usable as I2C1_SCL (default) or GPIO4_27
44	KPP_COL1	I	Keypad Column
45	AUD4_RFS	IO	Audio Port 4 usable also as GPIO2_0
46	KPP_COL2	I	Keypad Column
47	AUD4_RSCK	IO	Audio Port 4 usable also as GPIO2_3
48	KPP_COL3	I	Keypad Column
49	AUD4_TX	O	Audio Port 4 usable also as GPIO2_4
50	KPP_COL4	I	Keypad Column
51	AUD4_RX	I	Audio Port 4 usable also as GPIO2_5
52	KPP_COL5	I	Keypad Column
53	AUD4_TSCK	IO	Audio Port 4 usable also as GPIO2_6
54	P_VIDEO	PWR	Power Supply
55	AUD4_TFS	IO	Audio Port 4 usable also as GPIO2_7
56	P_AUDIO	PWR	Power Supply
57	GND	PWR	Power Ground
58	P_5V0	PWR	Power Supply
59	GND	PWR	Power Ground
60	P_5V0	PWR	Power Supply

Table 4-3: GPIO / Automation Connector pin description

4.2 Digital Video Connector (X11)

The Video Extension Connector is designed to add a custom video extension board with user-defined camera and display components, e.g. a CMOS sensor and a LCD display.

Additionally, some GPIOs are available for configuring the interface and handshaking. Touchscreen functionality can be implemented by connecting four analog lines, which are routed to the MC13892, to an appropriate display.
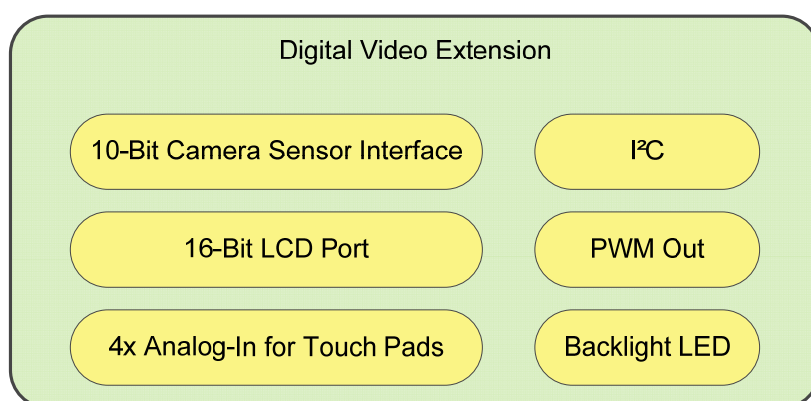

Figure 4-4: Digital Video Connector

4.2.1 Camera Sensor Interface Port (CSI1)

A camera (e.g. an OmniVision OV2640 or OV2655) can be connected to the SBC-i.MX51x board using the CMOS Sensor Interface 1 (CSI1).

Interface	Pins	Power Domain	Description
CSI1_Data	10	P_SW4	CSI1.D0 - CSI1.D9
CSI1_Control	5	P_SW4	CSI1.VSYNC, CSI1.HSYNC, CSI1.PIXCLK, CSI1.MCLK, CSI1.PWDN
I²C2	2	P_VIOHI	I2C2.SDA, I2C2.SCL

Table 4-4: CSI1 Interface description

4.2.2 LCD Port (DISP2)

The DISP2 interface is available to connect an LCD display to the SBC-i.MX51 board. On the secondary display port, the i.MX51 supports resolutions up to 1280X768.

Interface	Pins	Power Domain	Description
DISP2_Data	16	P_VIOHI	DISP2.D0 – DISP2.D15
DISP2_Control	3	P_VIOHI	DISP2.VSYNC, DISP2.HSYNC, DISP2.CLK
DISP2_Control	1	P_SW4	DISP2.DE
PWM	2	P_VIOHI	PWM1, TFT.PWRCTRL - Contrast
LED	2	P_SWLED	LED.MD - Display Backlight
ADIN	4	-	ADIN[1..4] – Touch screen

Table 4-5: DISP2 Interface description

4.2.3 Power Supplies

The Video Extension Connector provides six different supply voltages. They can be used for a custom extension board. Some supply voltages are generated by the MC13892 and can be set to different values. They must be set and enabled first, by configuring the companion IC. The following table shows the maximum supply current for each voltage.

Signal Name	Voltage	Maximum Current
P_5V0	5.0V	500mA[3]
P_SW4[1]	1.8V	50mA[3]
P_GEN3	1.8V, 2.9V	50mA[3]
P_DIG	1.05V, 1.25V, 1.65V, 1.8V	50mA
P_CAM	2.5V, 2.6V, 2.75V, 3.0V	250mA
P_SWLED[2]	4.3V to 26.5V	60mA

Table 4-6: Maximum power consumption for the Digital Video Connector supplies

[1] It is not advisable to alter these voltages; otherwise the board may get damaged.

[2] The P_SWLED voltage drives the LEDs connected to the LED-Driver Pins. The output voltage will be set automatically by the MC13892. For LED connectivity, see Figure 4-3.

[3] Be aware that this power supply is available on both extension connectors and this is the maximum current that can be drawn altogether.

4.2.4 Pin Description Table

Pin No	Signal	Type	Description
1	GND	PWR	Power Ground
2	DISP2_DAT0	O	Display Port 2 Data
3	DISP2_DAT1	O	Display Port 2 Data
4	DISP2_DAT2	O	Display Port 2 Data
5	DISP2_DAT3	O	Display Port 2 Data
6	DISP2_DAT4	O	Display Port 2 Data
7	GND	PWR	Power Ground
8	DISP2_DAT5	O	Display Port 2 Data
9	DISP2_DAT6	O	Display Port 2 Data
10	DISP2_DAT7	O	Display Port 2 Data
11	DISP2_DAT8	O	Display Port 2 Data
12	DISP2_DAT9	O	Display Port 2 Data
13	DISP2_DAT10	O	Display Port 2 Data
14	GND	PWR	Power Ground
15	DISP2_DAT11	O	Display Port 2 Data
16	DISP2_DAT12	O	Display Port 2 Data
17	DISP2_DAT13	O	Display Port 2 Data
18	DISP2_DAT14	O	Display Port 2 Data
19	DISP2_DAT15	O	Display Port 2 Data
20	GND	PWR	Power Ground
21	GND	PWR	Power Ground
22	DI2_DISP_CLK	O	Display Port 2 Clock
23	DI2_PIN2	O	Display Port 2 HSYNC
24	DI2_PIN3	O	Display Port 2 VSYNC
25	DI_GP4	O	Display Port 2 Data Enable
26	GND	PWR	Power Ground
27	GPIO1_2	IO	GPIO with PWM functionality
28	EIM_A26	IO	usable as GPIO2_20
29	GND	PWR	Power Ground
30	P_SWLED	PWR	LED Power Supply
31	P_5V0	PWR	Power Supply
32	LED_MD	O	LED driver output connected to MC18392
33	ADIN1	I	Analog input for touch pad usage connected to MC18392
34	ADIN3	I	Analog input for touch pad usage connected to MC18392
35	ADIN2	I	Analog input for touch pad usage connected to MC18392
36	ADIN4	I	Analog input for touch pad usage connected to MC18392
37	P_GEN3	PWR	Power Supply
38	GND	PWR	Power Ground
39	CSI1_D10	I	CMOS sensor interface 1 Data
40	CSI1_D11	I	CMOS sensor interface 1 Data
41	CSI1_D12	I	CMOS sensor interface 1 Data
42	CSI1_D13	I	CMOS sensor interface 1 Data
43	CSI1_D14	I	CMOS sensor interface 1 Data
44	CSI1_D15	I	CMOS sensor interface 1 Data
45	CSI1_D16	I	CMOS sensor interface 1 Data
46	CSI1_D17	I	CMOS sensor interface 1 Data
47	CSI1_D18	I	CMOS sensor interface 1 Data
48	CSI1_D19	I	CMOS sensor interface 1 Data
49	CSI1_VSYNC	I	CMOS sensor interface 1 VSYNC
50	GND	PWR	Power Ground
51	CSI1_HSYNC	I	CMOS sensor interface 1 HSYNC

Pin No	Signal	Type	Description
52	CSI1_PIXCLK	I	CMOS sensor interface 1 Pixel Clock
53	CSI1_D8	O	usable as GPIO3_12
54	CSI1_MCLK	O	CMOS sensor interface 1 Master Clock
55	P_SW4	PWR	Power Supply
56	CSPI1_MOSI	IO	usable as I2C1_SDA (default) for cam configuration or GPIO4_22
57	P_DIG	PWR	Power Supply
58	CSPI1_SCLK	IO	usable as I2C1_SCL (default) for cam configuration or GPIO4_27
59	P_CAM	PWR	Power Supply
60	GND	PWR	Power Ground

Table 4-7: Digital Video Connector pin description

4.3 Audio Connector (X17)

This extension connector contains the analog audio signals, as well as an SPDIF interface. This connector is also compatible with some Nano-ITX chassis.

Pin No	Description	Pin No	Description
1	SPDIF	2	P_5V0
3	GND	4	n.c.
5	Headphone right	6	Headphone left
7	Line in right	8	Line in left
9	n.c.	10	Microphone in
11	n.c.	12	n.c.
13	GND	14	GND

Table 4-8: Audio Extension Connector pin description

4.4 Reset / Power-On Connector (X16)

The two signals Power-On and Reset are accessible via this connector. These signals are the same as the ones routed to the two push buttons.

Pin No	Signal	Description	Pin No	Signal	Description
1	PON1	Power On (internally pulled up)	2	GND	Signal ground
3	POR	Power On Reset (internally pulled up)	4	GND	Signal ground

Table 4-9: Reset / Power-On Connector pin description

4.5 Power Supply Connector (X18)

The alternate Power Supply Extension Connector provides powering the board via a 3-pin header.

Pin No	Signal	Description
1	GND	Power Ground
2	PDI	Power Detect Input (leave open if unused)
3	VIN	Power Supply

Table 4-10: Power Supply Extension Connector pin description

5 Operating Conditions

This section provides the operating conditions for the SBC-i.MX51 Single Board Computer.

5.1 Electrical Characteristics

Parameter	Symbol	Min	Typ.	Max	Unit
Main Power Supply Voltage	VIN	6.0	12.0	16.0	V
Board Power Consumption [1]		-	2.5	5	W
Operating Temperature		-30	-	85	°C
Processor Clock Frequency	CPUCLK	TBD	800	800	MHz
USB Supply Voltage	VUSBx	4.5	5.0	5.5	V
USB Supply Current	VUSBx	-	-	500	mA
Extender Supply Voltage	P_5V0	4.5	5.0	5.5	V
Extender Supply Current	P_5V0	-	-	500	mA

Table 5-1: Operating Conditions

[1] The Power consumption refers to a single board, with no Extension Boards or USB-Devices plugged in.

5.2 Digital I/O Characteristics

Most IO pins available on the Extension Connectors (X3 and X11) are connected to the i.MX, and are assigned to one of three power domains.

Parameter	Power Domain	Symbol	Min	Typ.	Max	Unit
High-Level Output Voltage	P_VIOHI	V_{oh}	2.625	2.775	3.075	V
High-Level Output Voltage	PGEN2	V_{oh}	3.0	3.15	3.45	V
High-Level Output Voltage	P_SW4	V_{oh}	1.65	1.8	2.1	V
Low-Level Output Voltage	all domains	V_{ol}	-	-	0.15	V
High Level Output Current	all domains	I_{oh}	1.9	-	6.6	mA
Low-Level Output Current	all domains	I_{ol}	1.9	-	6.6	mA
High-Level Input Voltage	P_VIOHI	V_{ih}	1.95	-	2.775	V
Low -Level Input Voltage	P_VIOHI	V_{il}	0	-	0.83	V
High-Level Input Voltage	PGEN2	V_{ih}	2.21	-	3.15	V
Low-Level Input Voltage	PGEN2	V_{il}	0	-	0.94	V
High -Level Input Voltage	P_SW4	V_{ih}	1.26	-	1.8	V
Low -Level Input Voltage	P_SW4	V_{il}	0	-	0.54	V

Table 5-2: Digital IO characteristics

5.3 Analog Inputs

The 10-bit ADC, which is integrated in the MC13892, allows measuring analog voltages. These analog inputs are mainly used for touchpad sensing or voltage (battery) monitoring.

Parameter	Symbol	Min	Typ.	Max	Unit
Resolution			10		Bit
Conversion Current	I_c		1		mA
Conversion Core Input Voltage	V_{in}	0	-	2.4	V
Conversion Time Per Channel	t_c			10	µs

Table 5-3: ADC characteristics

5.4   Boot Mode Settings

The SBC supports three different boot modes. For USB/UART boot mode, the i.MX51 is polling for activity on both USBOTG and UART1.
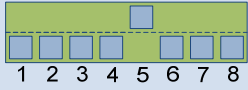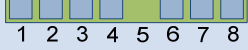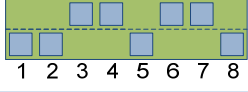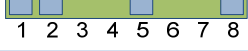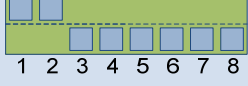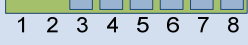
Mode	Boot Switch Setting	Boot Media
1	On / Off 1 2 3 4 5 6 7 8	SD Card
2	On / Off 1 2 3 4 5 6 7 8	NAND Flash
3	On / Off 1 2 3 4 5 6 7 8	USBOTG **or** UART1 (UART-USB-Bridge)

Table 5-4: Boot Modes

6 Mechanical specification

This section shows the position of all connectors and mounting holes.

6.1 Connector Locations
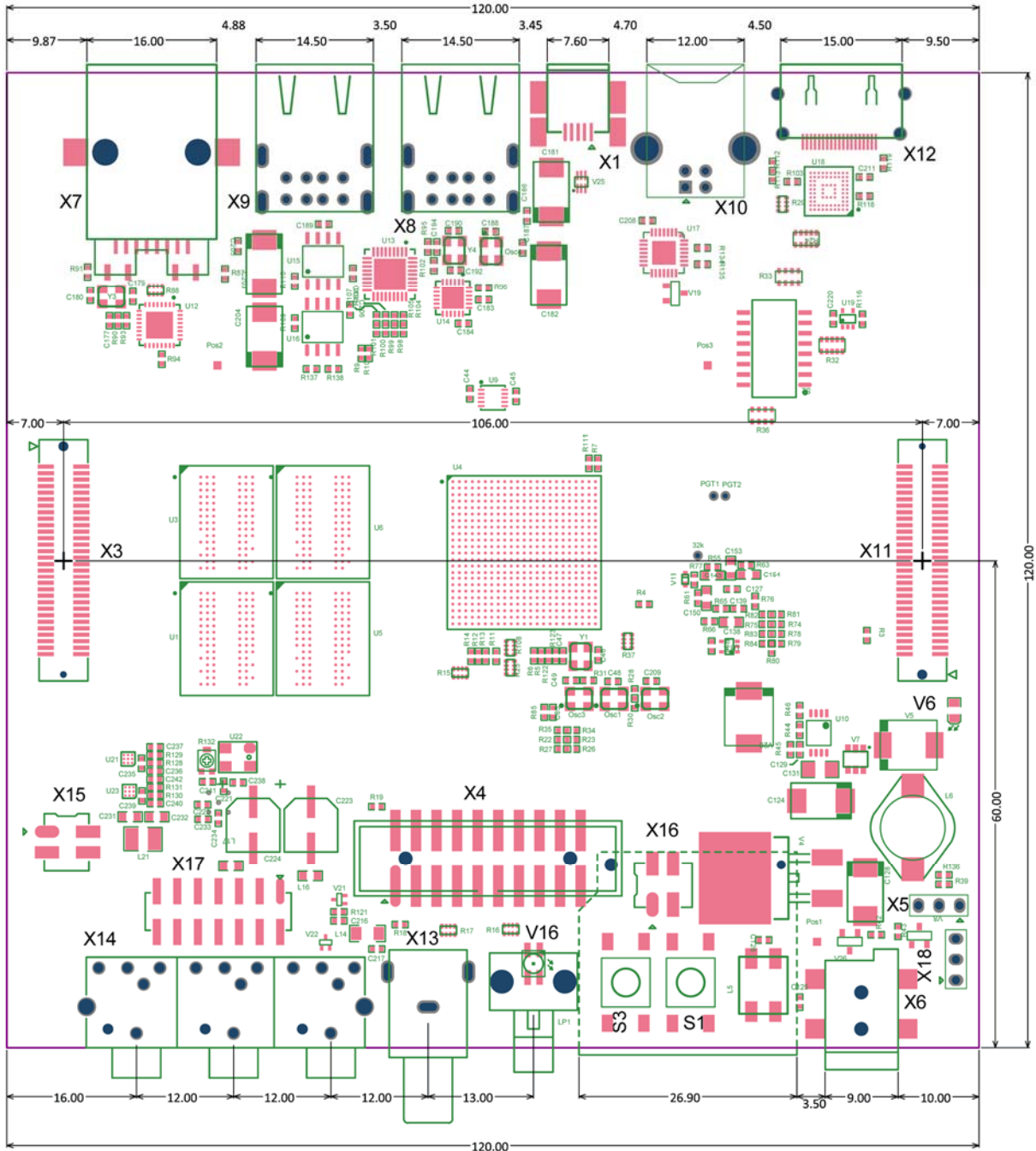
Figure 6-1: Connector Dimensions

6.2   Mounting Hole Dimensions
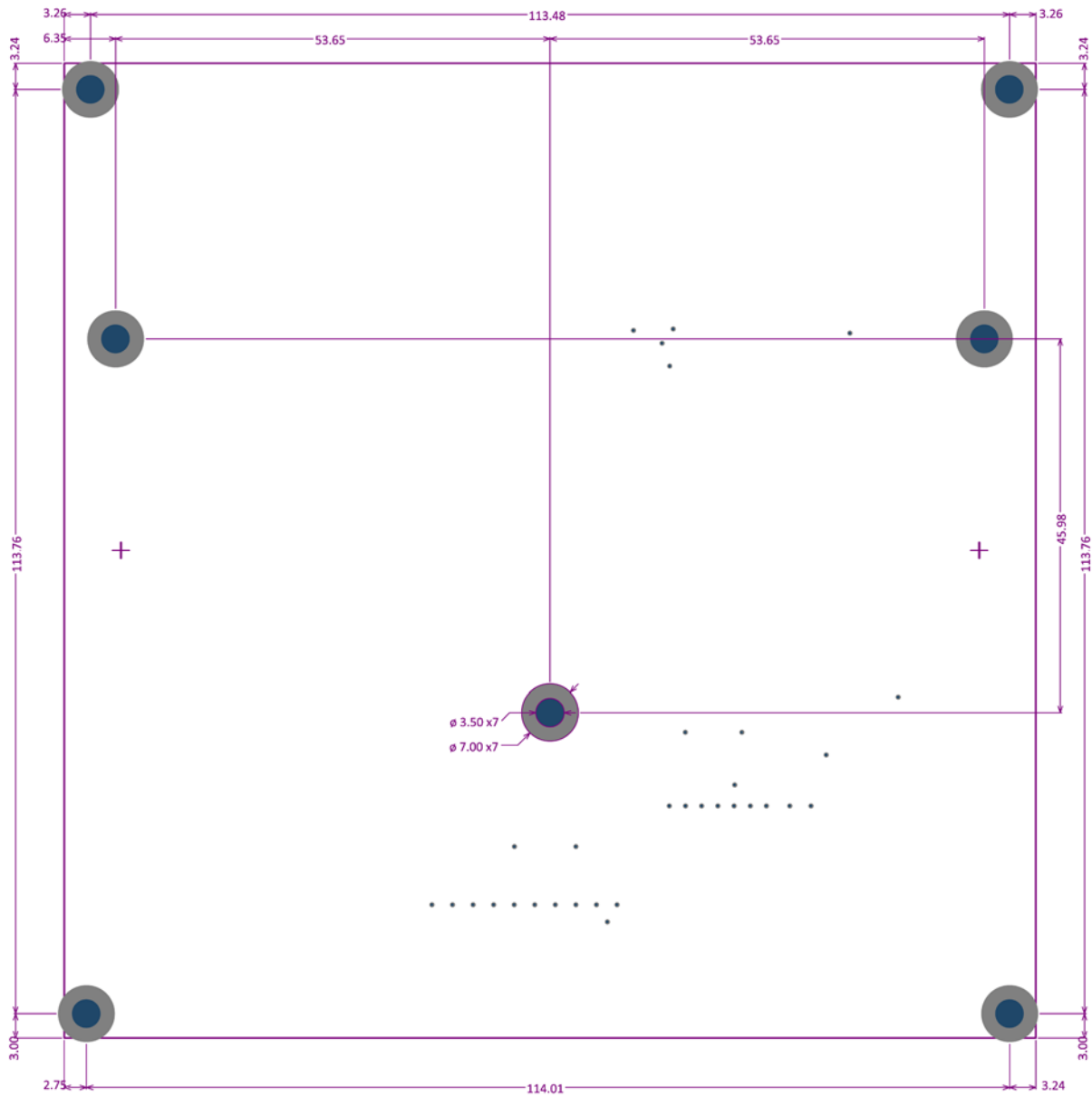
Figure 6-2: Mounting Hole Dimensions

7 Anomalies

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

http://www.bluetechnix.com/goto/sbc-i.mx51

8   Product Changes

In the following table, you can find changes and add-ons for different SBC versions.

Version	Type	Changes
1.2		First SBC release

Table 8-1: SBC-i.MX51 Product changes

For the latest product change information, please consult the product web page:

http://www.bluetechnix.com/goto/sbc-i.mx51

If you want to know in detail, which components are mounted on your board, please see the production information on our wiki page:

https://support.bluetechnix.at/wiki/Main_Page#SBC-i.MX51_documentation

9 Document Revision History

Version	Date	Document Revision
1	2010-05-11	First draft release.

Table 9-1: Revision History

10 List of Abbreviations

PWR   Power
O   Output
I   Input
IO   In-Out (bidirectional)
IpU   Input with internal pull-up resistor

11 List of Figures and Tables

Figures

Tables