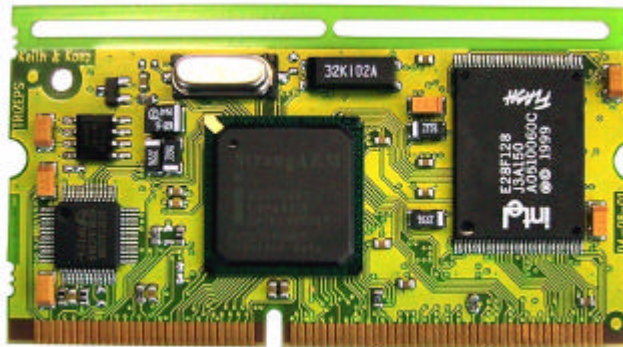


Trizeps Board (Revision 2.0)



1.0 Introduction

The Trizeps board is based on the Intel StrongArm SA-1110 Microprocessor - a highly integrated communications microcontroller that incorporates a 32-bit Strong-Arm Risc Processor core, system support logic, multiple communication channels, an LCD controller, a memory and PCMCIA controller, and general-purpose I/O ports. The SA-1110 is working very fast (150 Dhrystone 2.1 MIPS @ 133 MHz or 235 Dhrystone 2.1 MIPS @ 206 MHz) and needs very low power. Trizeps includes also the Philips UCB 1200 (a single chip, integrated mixed signal audio and telecom codec). The single channel audio codec is designed for direct connection of a microphone and a speaker. The built-in telecom codec can directly be connected to a DAA and supports high speed modem protocols. The incorporated analog to digital converter and the touch screen interface provides complete control and read-out of an 4 wire resistive touch screen.

The board offers the following features:

Single power supply +3V3	-PCMCIA interface with external buffers
Flash memory onboard (4, 8, <u>16</u> MByte)	-Universal serial bus device controller (UDC)
2 x synchronous DRAM (each 8, <u>16</u> , 32 MByte)	-Infrared communication port (ICP)
SA-1110	UCB 1200 codec
-LCD controller for monochrome	-Touch screen interface
4 Bpp to TFT 16 Bpp high resolution displays	-Speaker output
-3 serial interfaces - 3 UART:	-Microphone input
Serial CH1: SDLC/UART	-Telecom line interface
Serial CH2: UART/iRDA (max. 4 Mbit)	-4 x multiplexed analog voltage inputs (10 bit ADC)
Serial CH3: UART	JTAG test interface
	I ² C Bus

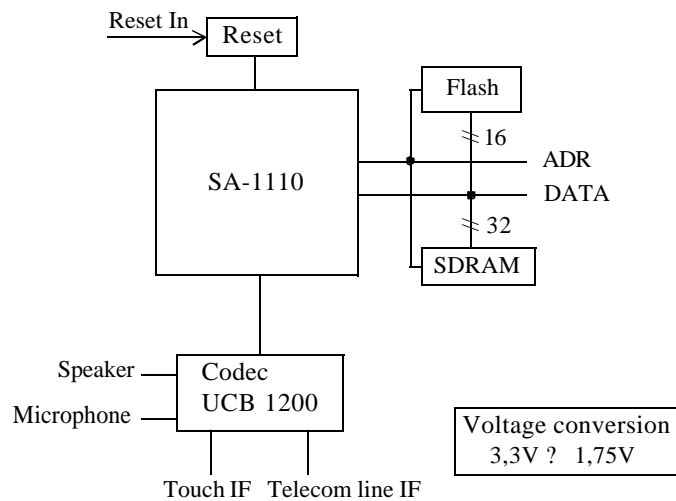
2.0 Functional description of the Trizeps Board

In the following you'll find the special information about the Trizeps Board. For information concerning the SA-1110 and the UCB1200 please refer to Intel's SA-1110 manual or Philips data sheet of the UCB 1200.

2.1 Components of the Trizeps Board

Figure 1.

Trizeps Board



Components of the Trizeps Board:

1. SA-1110 (microprocessor)
2. UCB 1200 (a single chip, integrated mixed signal audio and telecom codec)
3. Flash (Flash memory)
4. SDRAM (synchronous DRAM)
5. Voltage converter
6. Reset generator

2.1.1 Voltage

The operating voltage of the board is 3.3V. There is an additional voltage converter to 1.75V on board core voltage.

2.1.2 Memory

The usual configuration of the Trizeps offers 16 MByte Flash memory and 32 MByte synchronous DRAM. Configurations of 4MByte Flash and 16 to 64 MByte SDRAM are possible. The Flash and SDRAM memory build up BANK 0. The on board Flash is to be selected through $\overline{CS0}$. Flash uses 16 and the SDRAM 32 data-lines.

2.1.3 Codec

Trizeps includes also the Philips UCB 1200 (a single chip, integrated mixed signal audio and telecom codec). For a global description about the functions of the codec please refer to the introduction (chapter 1.0) of this guide. If you need a detailed description please refer to Philips data sheet. For interrupt programming of the codec use GP22 (IRQ). GP22 is a general purpose input/output of the SA-1110.

2.1.4 Serial port 0-3

Serial port 0 is an universal serial bus device controller that supports 3 endpoints and can operate half duplex at a baudrate of 12 Mbps (slave only).

Serial port 1 can be used either as an synchronous data link controller (SDLC) or as an universal asynchronous receiver/transmitter (UART) or as a combination of both (for special conditions please refer to the developer's manual of the SA-1110).

Serial port 2 works as infrared communications port (ICP). It operates at half-duplex and provides direct connection to commercially available Infrared Data Association (IrDA) compliant LED transceivers. The ICP supports both the original IrDA standard with speeds up to 115.2 Kbps as well as the newer 4-Mbps standard. Both standards use different bit encoding techniques and serial packet formats. Low-speed IrDA transmission uses the Hewlett-Packard Serial Infrared standard (HP-SIR) for bit encoding and an UART as the serial engine; high-speed uses Four-Position Pulse Modulation (4PPM) and a specialized serial packet protocol developed expressly for IrDA transmission.

Serial port 3 is a general-purpose, full-duplex UART that supports much of the functionality of the 16550 protocol. It can operate at baud rates from 56.24 bps to 230.4 Kbps.

2.1.5 PCMCIA interface

The PCMCIA interface provides controls for one PCMCIA card slot with a PSKT-SEL pin for support of a second slot. This 16-bit host interface supports 8- and 16-bit peripherals and handles common memory, I/O, and attribute memory accesses.

2.1.6 Reset

Resetting the board is possible by using the Reset input or by closing the soldering bridge below the reset generator 7733.

3.0 Firmware:

The Trizeps firmware package includes:

1. PBL (Primary Bootstrap Loader) and Angel Debug Monitor (ARM LTD). They are to be used with:

1. ARM Software Development Toolkit (SDT)
2. GNU Debugger with RDi Protocol

2. BOOTP/ TFTP Bootstrap Loader (Keith & Koep). It offers the following features:

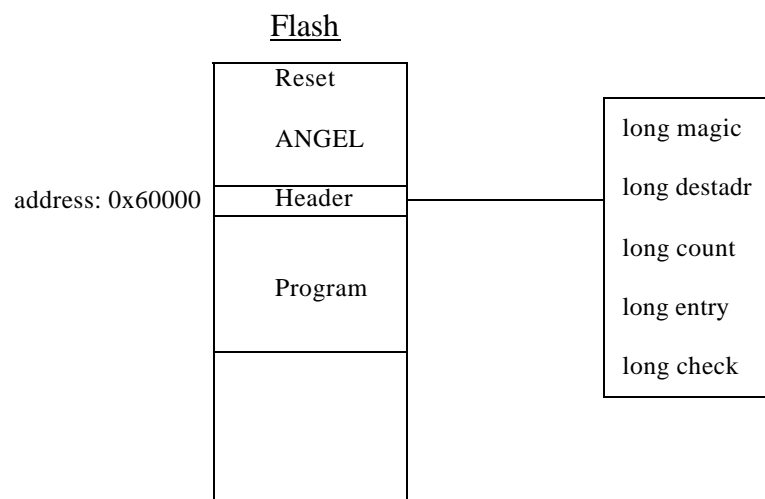
1. BOOTP/TFTP download with Ethernet support
2. Special download with simple serial protocol
3. Flash support
4. On board selftest

3.1 Bootstrap procedure

After reset the processor starts the PBL as a part of the Angel Debug Monitor. The PBL sets up the memory system and the MMU and decides to enter Angel or a customer program. If the soldering bridge left below SA-1110 is closed PBL will enter Angel. The communication goes via RxD1, TxD1. If the bridge is open PBL looks for a valid header of a customer program (normally K&K BOOTSTRAP LOADER). If the header is valid the program will be started - otherwise ANGEL will be started.

Figure 2.

Flash



If the value of magic (Flashaddress + 0x60000) is equal to 0x55aa5a5a the header is valid. The destination address (destadr) indicates the beginning of the program. Count means the length of the program. Entry indicates where to jump after loading. Check is for future use only.

4.0 DC operating conditions

1. Supply voltage 3.3 V
2. Typical operating current @ 191 MHz, 32MB SDRAM

Running	360 mA
Idle	125 mA
Suspend	4.8 mA

5.0 Ordering Information

1. Trizeps 16MB Flash/16MB SDRAM Trizeps-16/16
2. Trizeps 16MB Flash/32MB SDRAM Trizeps-16/32
3. Trizeps 16MB Flash/64MB SDRAM Trizeps-16/64
4. Trizeps 4MB Flash/16MB SDRAM Trizeps-04/16

Trizeps-16/32 is the most commonly used part.

6.0 Pinout information and description

In the following you'll find the pinout of the Trizeps (SODIMM-Socket).

TABLE 1.

Pinout information of the Trizeps Board

Pin	Name	Description
1	TSMY	negative Y-plate touch screen (UCB 1200)
2	TSMX	negative X-plate touch screen (UCB 1200)
3	TSPY	positive Y-plate touch screen (UCB 1200)
4	TSPX	positive X-plate touch screen (UCB 1200)
5	MIC_OUT	microphone input signal
6	$\overline{\text{DAA_RI}}$	telecom line interface
7	MIC_GND	microphone ground switch input
8	DAA_OH	telecom line interface
9	SPKRN	negative speaker output (UCB 1200)
10	DAA_T1	telecom line interface
11	SPKRP	positive speaker output (UCB 1200)
12	DAA_T2	telecom line interface
13	AD3	analog voltage input (UCB 1200)
14	AD2	analog voltage input (UCB 1200)
15	AD1	analog voltage input (UCB 1200)
16	AD0	analog voltage input (UCB 1200)
17	GND	Ground
18	GND	Ground
19	TMS	JTAG test interface mode select (SA-1110)
20	TCK	JTAG test interface reference clock (SA-1110)
21	$\overline{\text{TRST}}$	test interface reset (SA-1110)
22	TDO	JTAG test interface data output (SA-1110)
23	$\overline{\text{RESET_IN}}$	reset input
24	TDI	JTAG test interface data input (SA-1110)
25	$\overline{\text{RESET_OUT}}$	reset output (SA-1110)
26	L_BIAS	LCD ac bias drive
27	RXD_1S	serial port one receive pin (SDLC) (SA-1110)
28	BATT_FAULT	battery fault - main power is going down (SA-1110)
29	TXD_1S	serial port one transmit pin (SDLC) (SA-1110)
30	RXD_2	serial port two receive pin (IrDA) (SA-1110)
31	RXD_3	serial port three receive pin (UART) (SA-1110)
32	TXD_2	serial port two transmit pin (IrDA) (SA-1110)
33	TXD_3	serial port three transmit pin (UART) (SA-1110)
34	TUDC-	serial port zero bidirectional (UDC) (SA-1110)
35	+3V3	power supply
36	+3V3	power supply

TABLE 1.

Pinout information of the Trizeps Board

Pin	Name	Description
37	I2C_DATA	data I ² C Bus (SA-1110/GP27)
38	TUDC+	serial port zero bidirectional (UDC) (SA-1110)
39	GP 25	general purpose I/O / RTC_CLK (SA-1110)
40	I2C_CLK	clock I ² C Bus (SA-1110/GP26)
41	GP23	general purpose I/O (SA-1110)
42	GP24	general purpose I/O (SA-1110)
43	GP20	general purpose I/O (SA-1110)
44	GP21	general purpose I/O (SA-1110)
45	GP18	general purpose I/O (SA-1110)
46	GP19	general purpose I/O (SA-1110)
47	GP16	general purpose I/O (SA-1110)
48	GP17	general purpose I/O (SA-1110)
49	GP14	general purpose I/O (SA-1110)
50	GP15	general purpose I/O (SA-1110)
51	GP12	general purpose I/O (SA-1110)
52	GP13	general purpose I/O (SA-1110)
53	GP10	general purpose I/O (SA-1110)
54	GP11	general purpose I/O (SA-1110)
55	GP08	general purpose I/O (SA-1110)
56	GP09	general purpose I/O (SA-1110)
57	GP06	general purpose I/O (SA-1110)
58	GP07	general purpose I/O (SA-1110)
59	GP04	general purpose I/O (SA-1110)
60	GP05	general purpose I/O (SA-1110)
61	GP02	general purpose I/O (SA-1110)
62	GP03	general purpose I/O (SA-1110)
63	GP00	general purpose I/O (SA-1110)
64	GP01	general purpose I/O (SA-1110)
65	GND	Ground
66	GND	Ground
67	L_FCLK	LCD frame clock (SA-1110)
68	L_LCLK	LCD line clock (SA-1110)
69	L_PCLK	LCD pixel clock (SA-1110)
70	LDD6	LCD controller display data (SA-1110)
71	LDD7	LCD controller display data (SA-1110)
72	LDD4	LCD controller display data (SA-1110)
73	LDD5	LCD controller display data (SA-1110)
74	LDD2	LCD controller display data (SA-1110)

TABLE 1.

Pinout information of the Trizeps Board

Pin	Name	Description
75	LDD3	LCD controller display data (SA-1110)
76	LDD0	LCD controller display data (SA-1110)
77	LDD1	LCD controller display data (SA-1110)
78	GND	Ground
79	$\overline{\text{PWE}}$	PCMCIA write enable (SA-1110)
80	$\overline{\text{POE}}$	PCMCIA output enable (SA-1110)
81	$\overline{\text{PIOW}}$	PCMCIA I/O write (SA-1110)
82	$\overline{\text{PIOR}}$	PCMCIA I/O read (SA-1110)
83	$\overline{\text{PWAIT}}$	PCMCIA wait (SA-1110)
84	$\overline{\text{PIOIS16}}$	I/O select 16 (SA-1110)
85	$\overline{\text{PREG}}$	PCMCIA register select (SA-1110)
86	PSKTSEL	PCMCIA socket select (SA-1110)
87	$\overline{\text{PCE1}}$	PCMCIA card enable (low-byte lane) (SA-1110)
88	$\overline{\text{PCE2}}$	PCMCIA card enable (high-byte lane) (SA-1110)
89	+3V3	power supply
90	+3V3	power supply
91	D14	memory data (SA-1110)
92	D15	memory data (SA-1110)
93	D12	memory data (SA-1110)
94	D13	memory data (SA-1110)
95	D10	memory data (SA-1110)
96	D11	memory data (SA-1110)
97	D08	memory data (SA-1110)
98	D09	memory data (SA-1110)
99	D06	memory data (SA-1110)
100	D07	memory data (SA-1110)
101	D04	memory data (SA-1110)
102	D05	memory data (SA-1110)
103	D02	memory data (SA-1110)
104	D03	memory data (SA-1110)
105	D00	memory data (SA-1110)
106	D01	memory data (SA-1110)
107	GND	ground
108	GND	ground
109	RDY	static data ready signal (SA-1110)
110	$\overline{\text{WE}}$	memory write enable (SA-1110)
111	$\overline{\text{RD}}/\overline{\text{WR}}$	read/write direction control for memory and PCMCIA data bus (SA-1110)
112	$\overline{\text{OE}}$	memory output enable (SA-1110)

TABLE 1.

Pinout information of the Trizeps Board

Pin	Name	Description
113	GND	ground
114	$\overline{CS5}$	static chip select (SA-1110)
115	$\overline{CS4}$	static chip select (SA-1110)
116	$\overline{CS3}$	static chip select (SA-1110)
117	$\overline{CS2}$	static chip select (SA-1110)
118	$\overline{CS1}$	static chip select (SA-1110)
119	A25	memory address bus (SA-1110)
120	A24	memory address bus (SA-1110)
121	A23	memory address bus (SA-1110)
122	A22	memory address bus (SA-1110)
123	A21	memory address bus (SA-1110)
124	A20	memory address bus (SA-1110)
125	A19	memory address bus (SA-1110)
126	A18	memory address bus (SA-1110)
127	A17	memory address bus (SA-1110)
128	A16	memory address bus (SA-1110)
129	A15	memory address bus (SA-1110)
130	A14	memory address bus (SA-1110)
131	A13	memory address bus (SA-1110)
132	A12	memory address bus (SA-1110)
133	A11	memory address bus (SA-1110)
134	A10	memory address bus (SA-1110)
135	A09	memory address bus (SA-1110)
136	A08	memory address bus (SA-1110)
137	A07	memory address bus (SA-1110)
138	A06	memory address bus (SA-1110)
139	A05	memory address bus (SA-1110)
140	A04	memory address bus (SA-1110)
141	A03	memory address bus (SA-1110)
142	A02	memory address bus (SA-1110)
143	A01	memory address bus (SA-1110)
144	A00	memory address bus (SA-1110)

You can get detailed information about the socket in the internet (<http://www.amp.com>). Choose search - part number and enter the number 390113-1.

Appendix

7.0 Dimensions of the Trizeps Board

Figure 3. Dimensions of the Trizeps Board (top view)

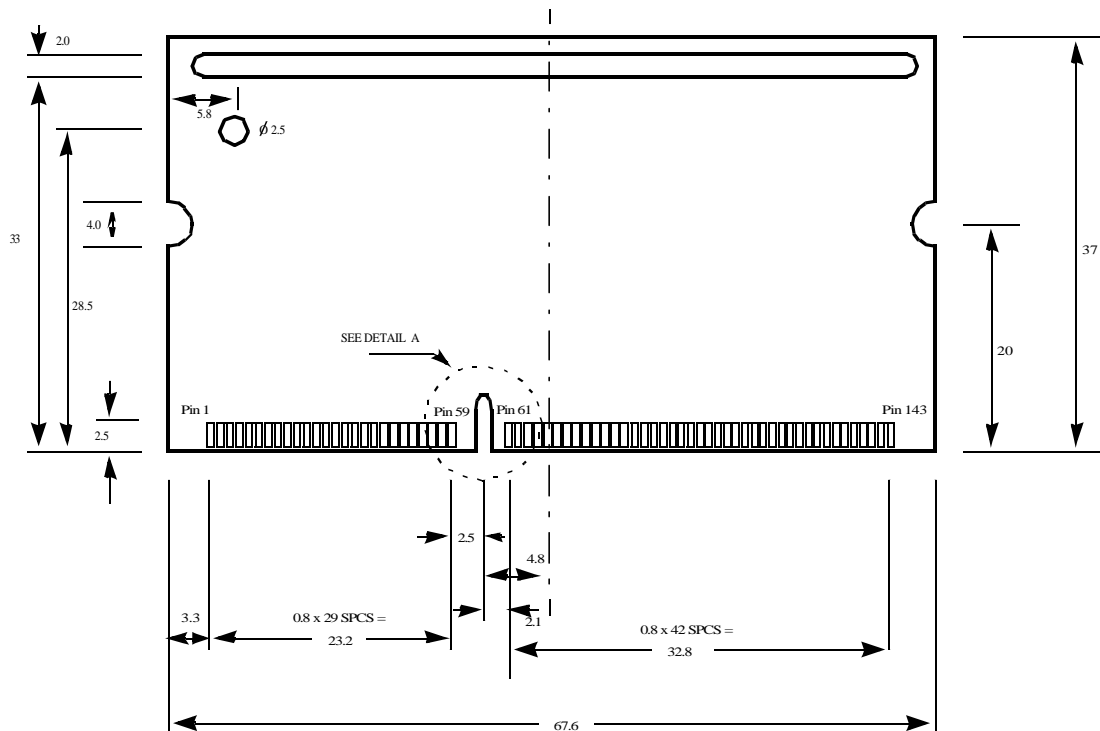


Figure 4. Detail A of Figure 3

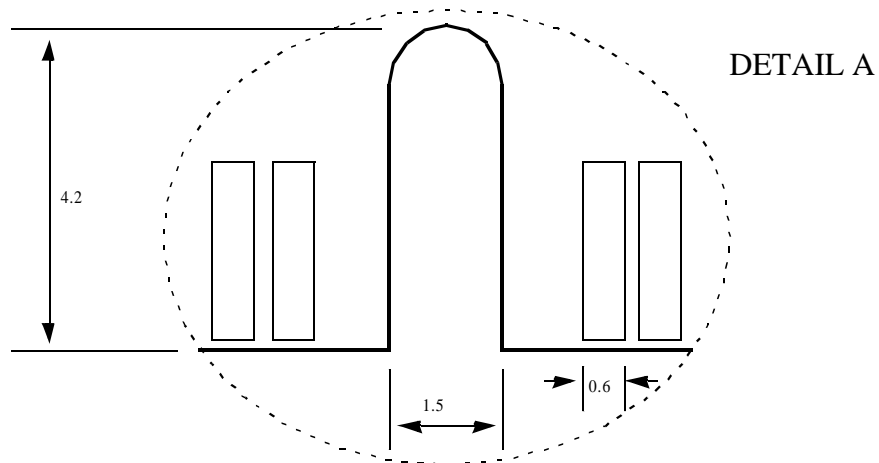
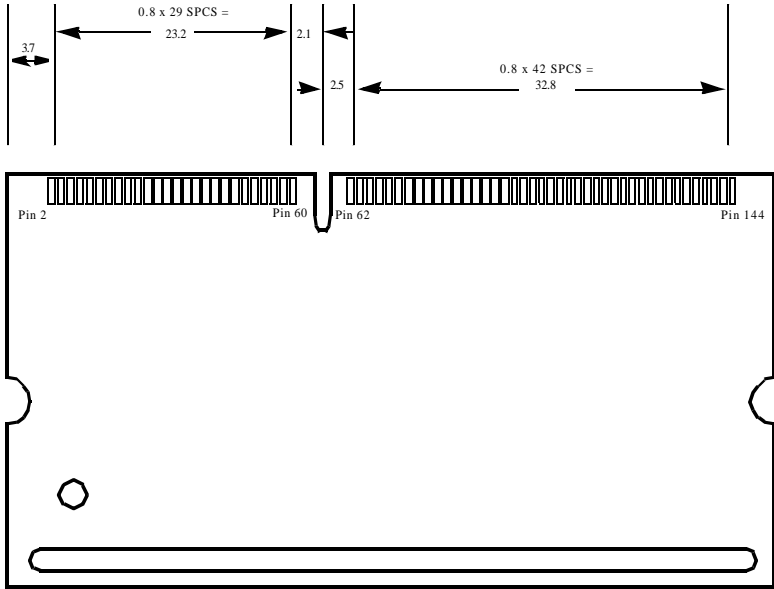


Figure 5.

Dimensions of the Trizeps Board (bottom view)



The Maximum height is 4.0 mm above the top side and 2.0 mm below the bottom side.

Revision

Board: Trizeps

Revision	PCB number	Date	Changes
1.0	02_06_00	28.11.00	-----
2.0	04_08_01	05.12.01	Replace reset jumper with soldering bridge Wake up from suspend modus by touch possible