CompuLab

SB-iAM
Evaluation board

Reference Guide

Table of Contents

1. Revision Notes

Date	Description
3-Nov-2009	▪ Preliminary release

2. Introduction

2.1. Highlights

- **mini-ATX PC implemented by the combination of a CM-iAM module and SB-iAM baseboard**
- **1 GB DDR2**
- **4 GB Flash Disk**
- **UXGA graphics controller with interfaces for LVDS, RGB, DVI and HDMI panels**
- **SATA hard disk interface**
- **2 x 1000 BaseT Ethernet ports**
- **6 x USB ports**
- **2 x SDIO sockets**
- **Sound codec with support for microphone and 2W speakers**
- **Host USB ports, including keyboard & mouse support**
- **Touchscreen interface**
- **PCI and PCI-express extension buses**
- **Serial port and GPIO's**
- **Programmable watchdog timer**
- **7 - 20 volt supply, 4 - 9 watt**
- **Battery operation support**

Note: some of above specified features are optional

The **SBC-iAM** is a standard mini-ATX compliant, single-board computer. It is implemented by a CM-iAM module providing most of the functions and a SB-iAM carrier board providing connectors and several additional functions. The rich feature set of the SBC-iAM is customizable according to the price / performance targets of the user's application.

The SBC-iAM contains expansion connectors opening it to the wide range of standard peripheral cards. Wide input range switched power supply is compatible with the requirements for telecom and automotive applications.

2.2. Block Diagram

2.3. Features

The "SB Option" column specifies the P/N code of SB-iAM required for the particular feature. The "CM Option" column specifies the P/N code of CM-iAM required for the particular feature. SB-iAM content is the combination of features provided by the attached CM-iAM and the features implemented on the SB-iAM itself. To have the particular feature, both the CM and SB options of that feature must be implemented.
"+" means that the feature is always available, regardless of P/N code.

Feature	Specification	SB Option	CM Option
CPU SDRAM Flash Disk	See Feature List of CM-iAM module		
COM-A	Full UART, RS-232 levels, DB9 connector	+	S
Hard disk	SATA interface	+	Y
Ethernet	One or two 1000 Mb Ethernet ports, using Realtek RTL8111 provided by CM-iAM CoM. RJ-45 connectors and activity LED's are provided on SB card.	+	Ex
TFT Panel	TFT (digital RGB) panel interface 18 and 24 bit. Two connectors for direct interfacing to certain TFT panels	+	L
LVDS Panel	4 pair LVDS panel interface	+	+
CRT Monitor	Analog RGB interface for CRT and FP monitors, through HDB15 connector	M	+
Host USB	6 USB Host ports, 480 Mbps. Type-A connector.	+	+
Sound I/O	IDT 92HD83 codec. 2 channel or 5.1 channel speaker output, line and microphone inputs. Standard 3.5 mm connectors. SPDIF on coaxial connector. Two options: - Codec on module, headphone / speakers output line in / microphone in - Codec on baseboard, 5.1 speaker output, SPDIF with optical interface	+ A	A +
PCI-express extension	Standard PCIexpress X1 slot	+	+
PCI extension	Single PCI slot, configurable 3.3V or 5V Vio Note: only one of extension slots is functional at a time: PCI or PCIexpress	P	+
SDIO sockets	2 standard SDIO sockets	+	+
RTC Battery	Real time clock operated from on-board rechargeable lithium battery	+	+
Power system	Support for two independent power sources with seamless switching, suitable for DC input / battery operation.	+	+

Electrical, Mechanical and Environmental Specifications

Supply Voltage	High efficiency switched power supply. Support of sleep mode. Input - unregulated 7V to 20V
Power Consumption	4W to 9W in full activity, depending on CPU speed and selected features Below 400 mW in sleep mode
Dimensions	190mm x 170mm Height ranges from 10 mm to 37 mm, depending on the connectors assembled. The height specified includes the CM-iAM module.
Operation temp. (case)	Commercial : 0o to 70o C
	Extended : -20o to 70o C
	Industrial : -40o to 85o C
Storage temp.	-40o to 85o C
Relative humidity	10% to 90% (operation)
	05% to 95% (storage)
Shock	50G / 20 ms
Vibration	20G / 0 - 600 Hz
MTBF	> 100,000 hours

3. Connector Description

The SB-iAM uses the attached CM-iAM module to implement most of the provided functions. For these functions, the SB-iAM routes the signals from the CM-iAM's miniature connectors to the standard connectors. Each function's description is therefore provided in the CM-iAM Reference Guide. The section below describes only the external interface connectors. The subsequent section provides the specifications of those functions implemented on the SB-iAM itself.

3.1. COM1 Connector (P40B)

Standard DB9 connector, RS-232 levels

Pin	Name	Pin	Name
S1	COM1-DCD	S6	COM1-DSR
S2	COM1-RXD	S7	COM1-RTS
S3	COM1-TXD	S8	COM1-CTS
S4	COM1-DTR	S9	COM1-RI
S5	GND		

3.2. USB Connector (P3B, P4B, U6)

A standard dual USB Type-A stacked connector. P3B is used for USB0 and USB1 interfaces, P4B, for USB2 and USB3 interfaces and U6, for USB4 and USB5.

USB interface 0,2,4		USB interface 1,3,5	
Pin	Name	Pin	Name
1	VBUS	5	VBUS
2	DN	6	DN
3	DP	7	DP
4	GND	8	GND
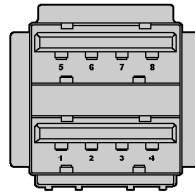
3.3. GPIO, Misc Header (P50)

2x20, 100 mil header

Pin	Name	Pin	Name
01	GPIO1	21	SMB_DATA
02	**GND**	22	**+V3.3**
03	**GND**	23	SMB_CLK
04	GPIO6	24	NC
05	GPIO2	25	NC
06	GPIO8	26	**GND**
07	SIO_GPIO10	27	HDA_SPKR
08	**GND**	28	PWRBTN#
09	SIO_GPIO11	29	NC
10	GPIO9	30	**GND**
11	SIO_GPIO13	31	NC
12	**+V5**	32	NAND_WP
13	GPIO_SUS0	33	GPIO6
14	SIO_GPIO15	34	WDI
15	GPIO_SUS1	35	NC
16	SIO_GPIO16	36	SIO_GPIO13
17	SCH_GPIOSUS_3	37	RST_IN#
18	SIO_GPIO20	38	WD_RESET#
19	**GND**	39	**GND**
20	SIO_GPIO12	40	RESET#

3.4. SATA connector (P35)

A standard Serial ATA connector

Pin	Name
1	GND
2	SATA-TXP
3	SATA-TXN
4	GND
5	SATA-RXN
6	SATA-RXP
7	GND
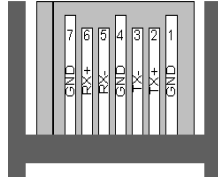
3.5. SDIO connectors (P33, P34)

P33-SDIO2, P34-SDIO0

Pin	Name
1	CD/DAT[3]
2	CMD
3	VSS1
4	VDD
5	CLK
6	Vss2
7	DAT[0]
8	DAT[1]
9	DAT[2]

SDIO1 is implemented as on-board micro-SD interface that doesn't have WP, so it's implemented on jumper P36. LED DS6 indicates SDIO1 activity.

3.6. Audio Interface (P21, P22, P23, P24, P25, P26, P27, P28, P29, P30, P31, P32, U9)

The SB-iAM provides core and base audio interfaces. Core audio relays on the HAD base using SDATAIN0 chipset input, and base audio uses SDATAIN1 according with the provision for additional external codec (such as an HDMI chip) on the SDVO extension slot - configurable through jumper E9. The schematic below demonstrates these relations:
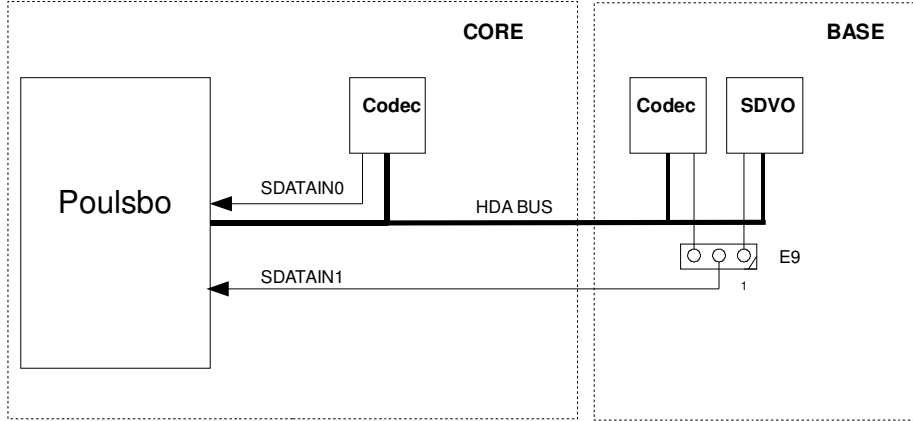
While the core audio interface provides three analog connectors and one RCA-based SPDIF, the base audio has seven outer connectors with RCA and optical SPDIF.

Core Audio

The following interfaces are provided:
- Stereo headphone / line out output (functioning controlled by software)
- Stereo line in/mic in (x2)
- RCA based SPDIF

Each audio analog interface is connected to a dedicated 3.5mm jack.
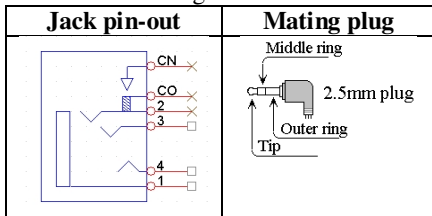
Headphone / line out (P31):

Pin	Name	Mating plug pin
1	GND	Outer ring
2	NC	-
3	HP_OUT_R	Middle ring
4	HP_OUT_L	Tip

Line in / Mic In (P29):

Pin	Name	Mating plug pin
1	GND	Outer ring
2	NC	-
3	LINE_IN_R	Middle ring
4	LINE_IN_L	Tip

Microphone in / Line in (P26):

Pin	Name	Mating plug pin
1	GND	Outer ring
2	NC	-

3	LINE_MIC_R	Middle ring
4	LINE_MIC_L	Tip

RCA jack

Jack pin-out	Mating plug
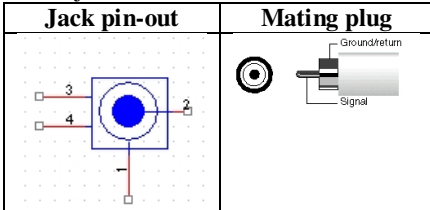
SPDIF OUT (P28) RCA jack

Pin	Name	Mating plug pin
1	GND	Ground/Return
2	SPDIF_CORE	Signal

Base Audio

The following interfaces are provided:
- Stereo headphone / line out (x3)
- Stereo line in / mic in (x2)
- Speaker output x2 (left, right)
- Dual SPDIF (RCA and optical based)

Headphone / line out (P22, P23, P25):

Pin	Name	Mating plug pin
1	GND	Outer ring
2	NC	-
3	OUT_R	Middle ring
4	OUT_L	Tip

Microphone in / Line in (P21, P24):

Pin	Name	Mating plug pin
1	GND	Outer ring
2	NC	-
3	IN_R	Middle ring
4	IN_L	Tip

SPDIF OUT (P27) RCA jack

Pin	Name	Mating plug pin
1	GND	Ground/Retrun
2	SPDIF_CORE	Signal

SPDIF OUT (U9) –optical transmitter, implemented by a 660nm AlGaInP LED and a driver IC. It transforms the electrical signal to optical signal for further transmission by 1mm diameter plastic optical fiber.

SPEAKER OUT (P30, P32)
W2B, Header, 2x1, 1.25mm (Molex P/N 53261-0271)

Pin	Name	Mating plug pin
1	SPKR+	Ground/Return
2	SPKR-	Signal

3.7. CRT VGA CONNECTOR (P40A)

An HDB15 standard CRT connector

Pin	Name
V1	RED
V2	GREEN

V3	BLUE
V4	N/C
V5	**GND**
V6	**GND**
V7	**GND**
V8	**GND**
V9	VCC3
V10	**GND**
V11	N/C
V12	N/C
V13	HSYNC
V14	VSYNC
V15	N/C

A standard HDB-15 connector is used to connect the CRT display directly. This connector is available only with the front panel option.

3.8. LCD Panel Connector 18-bit (P39)

40-pin FPC connector for TFT panels

Pin	Name	Pin	Name
01	NC	21	**VCC3**
02	LCD-VDD-EN	22	NC
03	**GND**	23	NC
04	LCD-R0	24	**GND**
05	LCD-R1	25	NC
06	**VCC3**	26	LCD-B0
07	LCD-R2	27	**VCC3**
08	LCD-R3	28	LCD-B1
09	**GND**	29	LCD-B2
10	LCD-R4	30	**GND**
11	LCD-R5	31	LCD-B3
12	**VCC3**	32	LCD-B4
13	LCD-G5	33	**GND**
14	LCD-G4	34	LCD-B5
15	**GND**	35	LCD-DE
16	LCD-G3	36	**VCC3**
17	LCD-G2	37	LCD-LP
18	**VCC3**	38	LCD-FRM
19	LCD-G1	39	**GND**
20	LCD-G0	40	LCD-SCK

LCD-VDD-EN is an active low ENAVDD signal to be used in conjunction with the CONLCD-GEN-V2 adapter module, also available from CompuLab.

3.9. LCD Panel Connector 24-bit (P38)

2x20 W2B connector (Hirose DF13A-40DP-1.25V) for TFT panels (NOT ASSEMBLED)

Pin	Name	Pin	Name
1	**+V5**	21	LCD_G4
2	**+V5**	22	LCD_G5
3	**GND**	23	LCD_G6
4	**GND**	24	LCD_G7
5	**+V3.3**	25	LCD_R0
6	**+V3.3**	26	LCD_R1
7	LVDS_BEN	27	LCD_R2
8	**GND**	28	LCD_R3
9	LCD_B0	29	LCD_R4

10	LCD_B1	30	LCD_R5
11	LCD_B2	31	LCD_R6
12	LCD_B3	32	LCD_R7
13	LCD_B4	33	**GND**
14	LCD_B5	34	**GND**
15	LCD_B6	35	LCD_SCK
16	LCD_B7	36	LCD_VSYNC
17	LCD_G0	37	LCD_DE
18	LCD_G1	38	LCD_HSYNC
19	LCD_G2	39	NC
20	LCD_G3	40	LVDS_EN

3.10. LVDS Panel Connector (P37)

30-pin (2x15) 1.25mm pitch connector (Hirose DF13A-30DP-1.25V) for LVDS panels

Pin	Name	Pin	Name
1	LVDS_BEN	16	LVDS_DP3
2	NC	17	LVDS_DDCDATA
3	LVDS_PWR	18	LVDS_DDCCLK
4	**GND**	19	NC
5	LVDS_CKN	20	NC
6	LVDS_CKP	21	NC
7	LVDS_PWR	22	NC
8	**GND**	23	NC
9	LVDS_DN0	24	NC
10	LVDS_DP0	25	NC
11	LVDS_DN1	26	NC
12	LVDS_DP1	27	LVDS_PWR
13	LVDS_DN2	28	**GND**
14	LVDS_DP2	29	NC
15	LVDS_DN3	30	NC

3.11. PCI Slot (P51)

A standard PCI slot, 5V type
All non-obvious connections and unsupported signals are mentioned in notes.

Pin	Name	Notes	Pin	Name	Notes
B1	-12V	Use test point TP18 if needed	A1	TRST#	PU
B2	TCK	Connected to GND	A2	+12V	Ext. +12V
B3	GND		A3	TMS	Connected to GND
B4	TDO	N/C	A4	TDI	Connected to GND
B5	+5V		A5	+5V	
B6	+5V		A6	INTA#	
B7	INTB#		A7	INTC#	
B8	INTD#		A8	+5V	
B9	PRSNT#1	RC delay	A9	RESERVED	N/C
B10	RESERVED	N/C	A10	VIO	3.3V/5V
B11	PRSNT#2	RC delay	A11	RESERVED	N/C
B12	-	N/C	A12	-	N/C
B13	-	N/C	A13	-	N/C

B14	RESERVED	N/C	A14	3.3Vaux	3.3VSBY
B15	GND		A15	RST#	
B16	CLK		A16	VIO	3.3V/5V
B17	GND		A17	GNT	
B18	REQ#		A18	GND	
B19	VIO	3.3V/5V	A19	PME#	
B20	AD31		A20	AD30	
B21	AD29		A21	+3.3V	
B22	GND		A22	AD28	
B23	AD27		A23	AD26	
B24	AD25		A24	GND	
B25	+3.3V		A25	AD24	
B26	C/BE#3		A26	IDSEL	AD20
B27	AD23		A27	+3.3V	
B28	GND		A28	AD22	
B29	AD21		A29	AD20	
B30	AD19		A30	GND	
B31	+3.3V		A31	AD18	
B32	AD17		A32	AD16	
B33	C/BE#2		A33	+3.3V	
B34	GND		A34	FRAME#	
B35	IRDY#		A35	GND	
B36	+3.3V		A36	TRDY#	
B37	DEVSEL#		A37	GND	
B38	GND		A38	STOP#	
B39	LOCK#		A39	+3.3V	
B40	PERR#		A40	SDONE	PU
B41	+3.3V		A41	SBO#	PU
B42	SERR#		A42	GND	
B43	+3.3V		A43	PAR	
B44	C/BE#1		A44	AD15	
B45	AD14		A45	+3.3V	
B46	GND		A46	AD13	
B47	AD12		A47	AD11	
B48	AD10		A48	GND	
B49	M66EN	Jumper P53	A49	AD9	
B50	5V key		A50	GND	
B51	5V key		A51	GND	
B52	AD8		A52	C/BE#0	
B53	AD7		A53	+3.3V	
B54	+3.3V		A54	AD6	
B55	AD5		A55	AD4	
B56	AD3		A56	GND	
B57	GND		A57	AD2	
B58	AD1		A58	AD0	
B59	VIO	3.3V/5V	A59	VIO	3.3V/5V
B60	ACK64#	PU	A60	REQ64#	PU
B61	+5V		A61	+5V	
B62	+5V		A62	+5V	

3.12. PCIE Slot (P44)

PCIE x1 extension slot

Pin	Name	Notes	Pin	Name	Notes
B1	+12V	Ext. +12V	A1	PRSNT1#	Con. to GND
B2	+12V	Ext. +12V	A2	+12V	Ext. +12V
B3	+12V	Ext. +12V	A3	+12V	Ext. +12V

B4	GND		A4	GND	
B5	SMCLK	N/C	A5	TCK	NC
B6	SMDAT	N/C	A6	TDI	NC
B7	GND		A7	TDO	NC
B8	+3.3V		A8	TMS	NC
B9	TRST#	NC	A9	+3.3V	
B10	3.3VAux	+V3.3SBY	A10	+3.3V	
B11	WAKE#		A11	RERST#	
B12	RESERVED	N/C	A12	GND	
B13	GND		A13	REFCLK+	
B14	PETp0		A14	REFCLK-	
B15	PETn0		A15	GND	
B16	GND		A16	PERp0	
B17	PRSNT2#		A17	PERn0	
B18	GND		A18	GND	

3.13. SDVO extension slot (P42)

Video/audio extension input/output connector providing support for a wide range of extensions such as DVI, HDMI, VGA and others

Pin	Name	Pin	Name
1	GND	2	GND
3	SDVO_RED	4	GND
5	SDVO_RED#	6	SDVO_TVCLKIN
7	GND	8	SDVO_TVCLKIN#
9	GND	10	GND
11	SDVO_GREEN	12	GND
13	SDVO_GREEN#	14	SDVO_INT
15	GND	16	SDVO_INT#
17	GND	18	GND
19	SDVO_BLUE	20	GND
21	SDVO_BLUE#	22	SDVO_STALL
23	GND	24	SDVO_STALL#
25	GND	26	GND
27	SDVO_CLK	28	GND
29	SDVO_CLK#	30	RESET#
31	GND	32	GND
33	GND	34	GND
35	SDVO_CTRLCLK*	36	NC
37	GND	38	NC
39	SDVO_CTRLDATA*	40	NC
41	GND	42	NC
43	HDA_BITCLK	44	NC
45	GND	46	NC
47	HDA_RST#	48	+V5
49	HDA_SDATAIN	50	+V5
51	GND	52	+V5
53	HDA_SDATAOUT	54	+V5
55	HDA_SYNC	56	+V5
57	GND	58	+V5
59	NC	60	NC
61	+V5SBY	62	NC
63	+V5SBY	64	+V3.3SBY
65	NC	66	+V3.3SBY
67	NC	68	NC
69	NC	70	NC

71	+V3.3	72	+V3.3
73	+V3.3	74	+V3.3
75	+V3.3	76	+V3.3
77	+V3.3	78	+V3.3
79	+V3.3	80	+V3.3

*SDVO_CTRLDATA and SDVO_ CTRLCLK should be pulled up to 2.5V (when used) on the extension board - see the EB-DVI schematic for an example.

3.14. Ethernet Port 1 & 2 (P4A & P3A)

Standard RJ45 connectors P4A & P3A provide an interface for the two Gigabit Ethernet ports available in the CM-iAM module

Pin	Name	Description
1	BI_DA+	Bi-directional pair A +
2	BI_DA-	Bi-directional pair A -
3	BI_DB+	Bi-directional pair B +
4	BI_DC+	Bi-directional pair C +
5	BI_DC-	Bi-directional pair C -
6	BI_DB-	Bi-directional pair B -
7	BI_DD+	Bi-directional pair D +
8	BI_DD-	Bi-directional pair D -

3.15. Battery extension connectors (P13, P17, P18, P19, P20, P55)

P13: 16-pin 2x8 100 mil header

Pin	Name	Pin	Name
1	RESERVED	2	PWR_IN
3	RESERVED	4	PWR_IN
5	GND	6	PG#
7	GND	8	CH_STAT1
9	GND	10	CH_STAT2
11	SMB_DATA	12	BAT_FAULT
13	SMB_CLK	14	VBAT+
15	TS_BAT	16	VBAT+

P17, P55: 1x3 W2B 1.5mm connector (Molex P/N 87438-0343)

Pin P17	Name		Pin P55	Name
1	VBAT+		1	BAT_CON
2	TS_BAT		2	TS_BAT
3	BAT_CON		3	GND

P18: The 2-node terminal block used for battery connection

Pin	Name
1	VBAT+
2	GND

P19: The 2-node terminal block used for charger control signals

Pin	Name
1	TS_BAT
2	PG#

P20: The 2-node terminal block used for charger control signals

Pin	Name
1	CH_STAT1
2	CH_STAT2

3.16. Power Connector (J1, P11, P43, P54)

J1: DC Jack, external - 3.9mm, inner pin - 1.3mm diameter

Pin	Name	Description
1	PWR_IN	Inner pin
2	GND	Outer ring

P11: The 2-node terminal block used as an external charger power supply/main power (in parallel with J1)

Pin	Name
1	PWR_IN
2	GND

P43: The 2-node terminal block used as an external +12V source input for PCI/PCIE slots.

Pin	Name
1	+V12_EXT
2	GND

P54: The 2-node terminal block used as external +5V source output for the hard-disk power (1.5A maximum)

Pin	Name
1	+V12_EXT
2	GND

4. Functions Implemented on the SB-iAM

Most of the functions are implemented by the attached CM-iAM module, while the SB-iAM board provides related connectors or headers. Several additional functions are implemented on the SB-iAM itself and are described in this section.

4.1. PCIE mux

The SB-iAM has only one routed PCIE interface that can be muxed to PCIE x1 slot –setting E7 to [1-2] or leaving open, or to the PCIE-> PCI bridge setting E7 to [2-3]. Only one device can be used at a time. LED DS10 lights up when the PCIE->PCI bridge path is chosen.

4.2. PCIE to PCI bridge

The SB-iAM implements PCIE to PCI conversion using Pericom's PI7C9X111L bridge. Such an extension allows the user to take advantage of the huge variety of existing PCI peripheral devices implementing a wide range of functions. There are two additional power supplies for this function implemented on the SB-iAM-switcher based 3.3V->1.0V main power and LDO based 5VSBY->1.0VSBY for aux power.
Key features are:

- Compliant with PCI Express Base Specification, Revision 1.1
- Physical Layer interface (x1 link with 2.5Gb/s data rate)
- Lane polarity toggle
- Virtual Isochronous support (upstream TC1-7 generation, downstream TC1-7 mapping)
- Beacon support
- CRC (16-bit), LCRC (32-bit)
- ECRC and advanced error reporting
- Maximum payload size to 512 bytes
- Compliant with PCI-to-PCI Bridge Architecture Specification, Revision 1.2
- Compliant with PCI Bus PM Interface Specification, Revision 1.1
- Compliant with PCI Hot-Plug Specification, Revision 1.1
- 3.3V PCI signaling with 5V I/O tolerance
- Provides two level arbitration support for four PCI Bus masters
- 16-bit address decode for VGA
- Subsystem Vendor and Subsystem Device IDs support
- PCI INT interrupt or MSI Function support
- Power consumption typically less than 0.5 Watt
- Extended commercial temperature range (0C to 85C)

The SB-iAM PCI implementation is 5V tolerant and supports dual 3.3V/5V VIO configured by jumper E8. For 5V [1-2] and for 3.3V [2-3] or leave open (default). The PCI_AD20 signal is used for slot IDSEL.
The PCIE->PCI bridge uses an internal clock generator for a PCI slot that may be changed through P52 and P53 jumpers according to the table below:

P52	P53	Clock frequency
Open	Open	33Mhz
Open	Closed	66Mhz
Closed	Open	25Mhz
Closed	Closed	50Mhz

The PCI slot doesn't implement JTAG functionality or –12V (can be supplied through TP18).
+12V can be supplied through P43 for cards needing it.

4.3. Audio Codec

The SB-iAM implements on board 5.1 audio using the IDT 92HD83Cx chip. See CM-iAM for more information regarding codec capabilities.
The codec has three configurable HP/line outputs, two configurable MIC/LINE in, one dedicated stereo speaker output (2W) with support for 8/4 Ohm speakers and one SPDIF output provided through RCA and optical connectors.

This HDA device uses channel1 (SDATAIN_1) output to the chipset for communication, while the on-core audio codec uses channel0 for this, so jumper E9 (2-3) should be used for enabling communication. Operating systems provide support for switching between two channels (CODEC0 and CODEC1).
Setting E9 to [1-2] routes CODEC1 input to extension slot P42 for applications requiring such an interface.

4.4. LCD Power Switch

SB-iAM contains power switch for proper power sequencing of the LCD display. It is controller by LVDS_EN generated by CM-iAM onboard graphics controller.

4.5. Analog RGB

The SB-iAM implements on-board analog RGB (CRT) using the FMS3818 video DAC parallel RGB to CRT converter (option M – used in conjunction with CM-iAM option L).

4.6. Video extension slot

The SB-iAM implements SDVO interface for external video devices on connector P42.
The EB-DVI extension board provides such functionality for DVI interface. See
http://www.compulab.co.il/iam/html/iam-developer.py for more information and available extensions.

4.7. Power Supply Options

The SB-iAM supports unregulated 7.0-20V input voltage with standby support. The support for an external 2-cell LiPo battery is provided by a power path control with automatic switching between main / battery power. There are several possibilities provided on the board:

Native 7.0-20V input without external battery (power path control disabled)
For this option, assemble bypass jumper P6. Input voltage may be supplied through power jack J1 or 2-pin terminal block P11. LED always lit.

Mixed Vmin-20V main power/battery, using power path control (without charger)
For these options, leave P6 open and assemble jumper P15. Connect a 2-cell LiPo battery to connectors (P17, P55) or P18. When using external DC power simultaneously, batteries will be disconnected automatically and the unit will be fed by main power. Vmin should be greater that total Vbat to avoid battery damage and proper power path control functioning. LED DS18 indicates that a battery is connected. Batteries should be in similar condition for optimal performance.
In both cases, main power is supplied to 3 DC-to-DC converters: +V5SBY, +V5 and +V3.3 (not used for CM-iAM); additional +V3.3SBY voltage is derived from +V5SBY due to very low consumption (not used for CM-iAM).
The power up sequence is as following:
- +V5SBY is up (on the base - red LED's DS14 and DS16) and stable on the CM-iAM inputs
- CM-iAM enables all of the internal standby circuits, then the automatic power-on switches its state to ON and indicates readiness by drawing SUS_S3 signal low (green LED's DS15, DS17 on the base).
- Inverted SUS_S3 signal (EN) enables +V5 and +V3.3 power rails.
- Power down /standby sequence:
- Inverted SUS_S3 signal (EN) disables +V5 and +V3.3 power rails.
- +V5SBY remains ON

For turning ON (S5, S4, S3->S0), power button SW3 should be pressed. The CM-iAM requires only +V5/+V5SBY power rails.
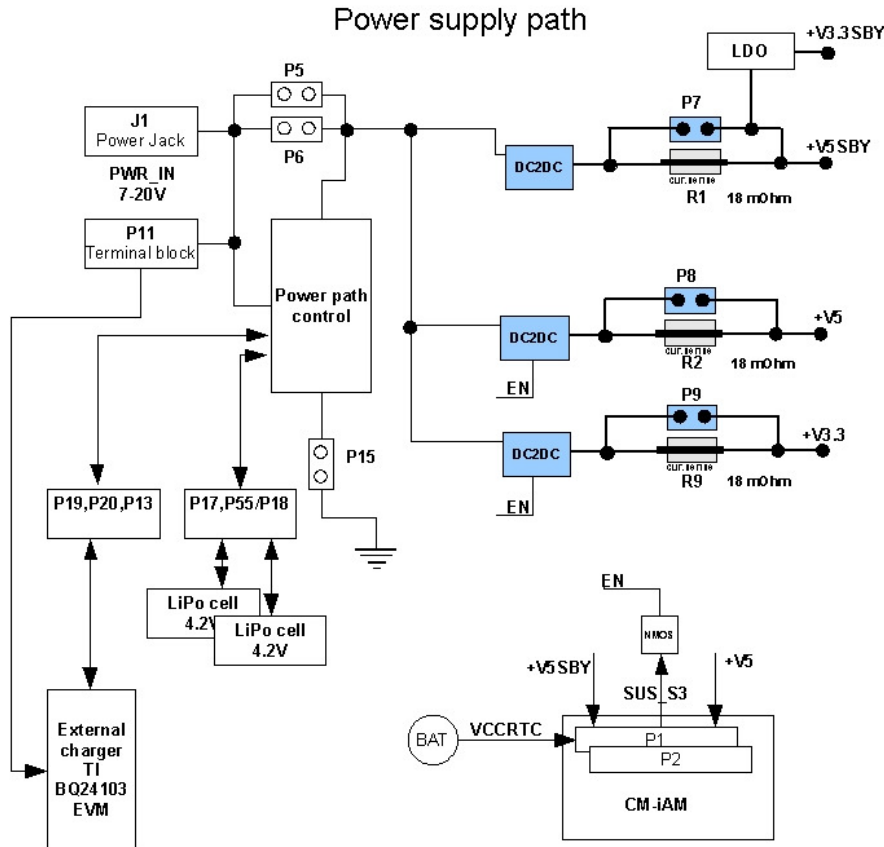
Figure 1

Jumpers P7, P8, and P9 are used for current consumption measurements. For normal operation, assemble the jumpers. For current consumption measurement, remove the jumper associated with the measured supply and then measure the voltage drop on a current sense resistor (R1, R2 or R9). The value of each current sense resistor is 18 mOhm +-1%.

Connector P54 (+V5) is used for supplying 5V external 2.5" HDD power supply.

Connector P43 (+12V) is used for supplying 12V to PCI/PCIE applications requiring 12V supply. In all other cases, it can be left unconnected.

USB power supply is limited to 1.5A total and 0.5A /port and has two options, configurable by jumper E10:
- +V5 (S0 only)
- +V5SBY (always on). This option is used for implementing system wakeup by keyboard / mouse.

4.8. Using external charger

For battery charging implementation, the external charger should be used.

The SB-iAM base provides support for an external charger such TI BQ24103 EVM (see http://focus.ti.com/docs/toolsw/folders/print/bq24103evm.html for more information).

When using an external charger, jumper P15 may be left open, allowing the charger's PG control output to manage the power control path. The table below shows possible connections and jumper setups for using this charger:

Board-to-board connections:

SB-iAM Connector/pin	TI BQ24103 EVM Connector/pin	Notes
P11-1 (PWR_IN)	J1-1 (DC+)	
P11-2 (GND)	J1-1 (DC-)	
P18-1 (VBAT+)	J2-4 (BAT+)	Use short wide wire

P18-1 (GND)	J2-1 (BAT-)	Use short wide wire
P19-1 (TS_BAT)	J2-2 (TS)	
P19-2 (PG#)	J3-1 (PG#)	
P20-1 (CH_STAT1)	J3-3 (STAT1)	Should be enabled on the BQ24103 EVM by jumper J7
P20-2 (CH_STAT2)	J3-4 (STAT2)	Should be enabled on the BQ24103 EVM by jumper J6

TI BQ24103 EVM jumper setup:

JUMPER	Position	Notes
J5	2-3	PG# out to the SB-iAM
J6	1-2	STAT1 out to the LED D3
J7	1-2	STAT1 out to the LED D1
J8	open	
J9	2-3	Always enabled
J10	1-2	Two cells

The charger acts as an independent autonomous unit with control of battery status. The SB-iAM doesn't implement system level control of current battery status, but provides the possibility of using an external battery control unit. All signals required for interfacing such a unit are provided on connectors. The red LED D3 is on when charging is in process, and the green LED D1 is on when batteries are charged.

4.9. Power output specifications

Below are specification ratings for the main power rails in the system:
Core configuration: CM-iAM-D1G-C1600-N4G-L-E2-S-A-Y
Base configuration: SB-iAM-M-P-A

Power rail	Maximum allowed output current	Average Consumption*	Notes
5V	2.5 A	0.7A	
5VSBY	2.5 A	0.31A	
3.3V	2.5 A	0.53A	Not used by the CM-iAM
3.3VSBY	0.4A	Derived from 5VSBY	

*Average consumption is measured without an external HDD, USB power is supplied by +V5SBY – using a USB and mouse keyboard with an EB-DVI video extension card; with PCIE routed directly to the PCIEX1 slot (PCIE->PCI bridge disabled).

4.10. Connector Location
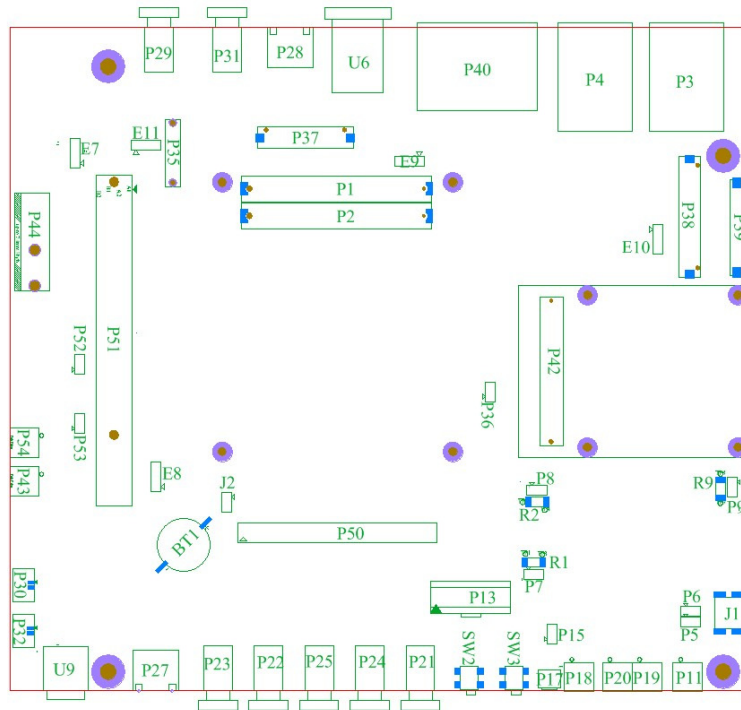
SB-iAM Top side
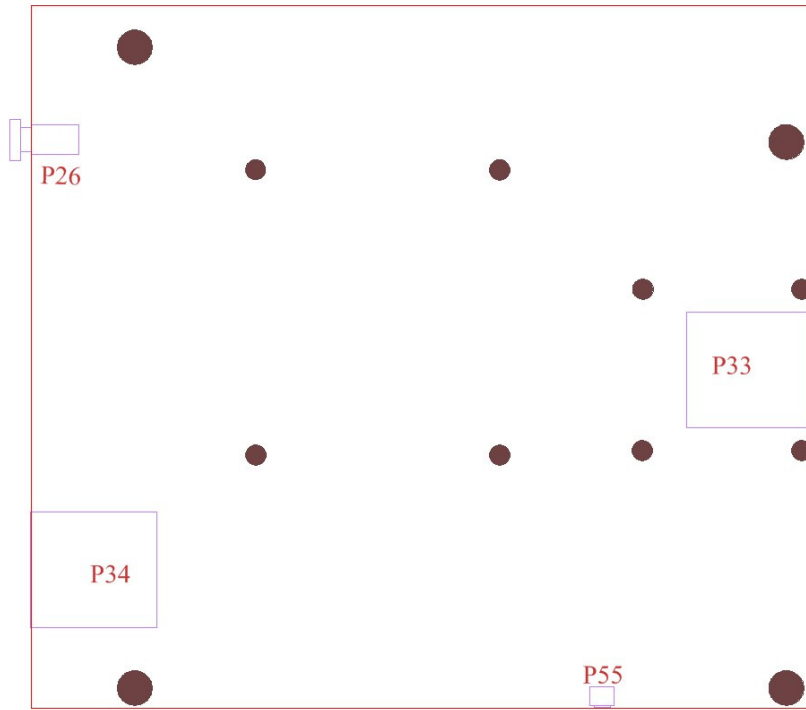
SB-iAM Bottom side (bottom view)

Reference

P1, P2	CM-iAM mating baseboard connectors
P3, P4	Dual USB + Ethernet Combo connector
P5, P6	Input power jumpers
P7	Jumper for 5VSBY
P8	Jumper for 5V
P9	Jumper for 3.3V
P10, P12, P14, P16, P41, P45, P46, P47, P48, P49, E1	DEBUG, don't use
P11	External charger power supply/Main power supply
P13	Battery/charger support connector
P15	Main /Battery path jumper
P17, P55	Battery connectors
P18, P19, P20	External charger support connectors
P21, P22, P23, P24, P25, P26, P29, P31	Core & Base 3.5mm Audio jacks
P27, P28	Core & Base SPDIF RCA jacks
P30, P32	Base audio speaker W2B 1x2 connectors
P33, P34	SDIO connectors
P35	SATA connector
P36	SDIO1 (on board) Write protect jumper
P37	2x15 LVDS connector
P38	2x20 W2B 24-bit LCD connector
P39	40-pin FPC 18-bit LCD connector
P40	Combo DB9/DB15 VGA and COM connector
P42	SDVO extension 2x80 connector
P43	PCI/PCIE external 12V source
P44	PCIEx1 connector
P50	2x20 header (GPIO's and other)
P51	Standard PCI connector
P52, P53	PCI clock input switch
P54	+5V output power for external HDD
E7	PCIE –PCIE bridge selection jumper
E8	3.3/5V PCI VIO power selection jumper
E9	Second codec input (to chipset) selector
E10	USB power source selector (5V/5VSBY)
E11	Primary master/slave selector for on board SATA/IDE
J1	Power jack
J2	RTC reset jumper
U6	Dual USB connector
U9	Optical SPDIF output
DS1, DS5	SDIO2 power/activity LED's
DS2, DS4	SDIO0 power/activity LED's
DS3	SATA activity LED
DS6	SDIO1 (on module) activity LED
DS7, DS8	Debug LED's
DS9/DS10	PCIE/PCI bridge select LED's
DS11	LVDS power enable LED
DS14, DS15, DS16, DS17, DS18	Power indicator LED's
SW1	Debug
SW2	Hardware reset switch
SW3	Power button (on / off / suspend)

Connector /jumpers/switches marked by the [GRAY] color are not assembled and are used for debug purposes.

4.11. Default jumper settings

JUMPER	Position	Notes
P6	open	
P7	closed	BYPASS R1
P8	closed	BYPASS R2
P9	closed	BYPASS R9
P15	closed	Enable power path
P52	open	Default: PCI clock 33 Mhz
P53	open	
E7	open	Default: PCIE->PCIE slot
E8	1-2	PCI VIO to +5V
E9	open	Default: on-base codec disconnected
E10	2-3	USB power from +V5SBY
E11	open	Default: SATA primary slave
J2	open	

5. Operating Temperature Ranges

The SB-iAM is available with three options of operating temperature range:

Commercial	0° to 70° C
Extended	-20° to 70° C
Industrial	-40° to 85° C

The cards' manufacturing and certification method for each option is explained in the "Operating Temperature Ranges" section of the CM-iAM Reference Guide.

The mating CM-iAM module should be ordered for the same as or better temperature range as of the SB-iAM. For example, there is no benefit in using a SB-iAM manufactured for the industrial temp range with a CM-iAM manufactured for the commercial temp range. Such a combination is practically limited to the commercial temp range.