

EB-iBT

Reference Guide



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Table 1 Document Revision Notes

Date	Description
December 2014	<ul style="list-style-type: none"><li data-bbox="549 365 671 387">• First release

1 INTRODUCTION

1.1 About This Document

This document is part of a set of reference documents necessary to operate CompuLab EB-iBT.

1.2 Related Documents

For additional information not covered in this manual, please refer to the documents listed in Table 2.

Table 2 Related Documents

Document	Location
SBC-iBT Resources	http://www.compulab.co.il/products/sbcs/sbc-ibt/

2 OVERVIEW

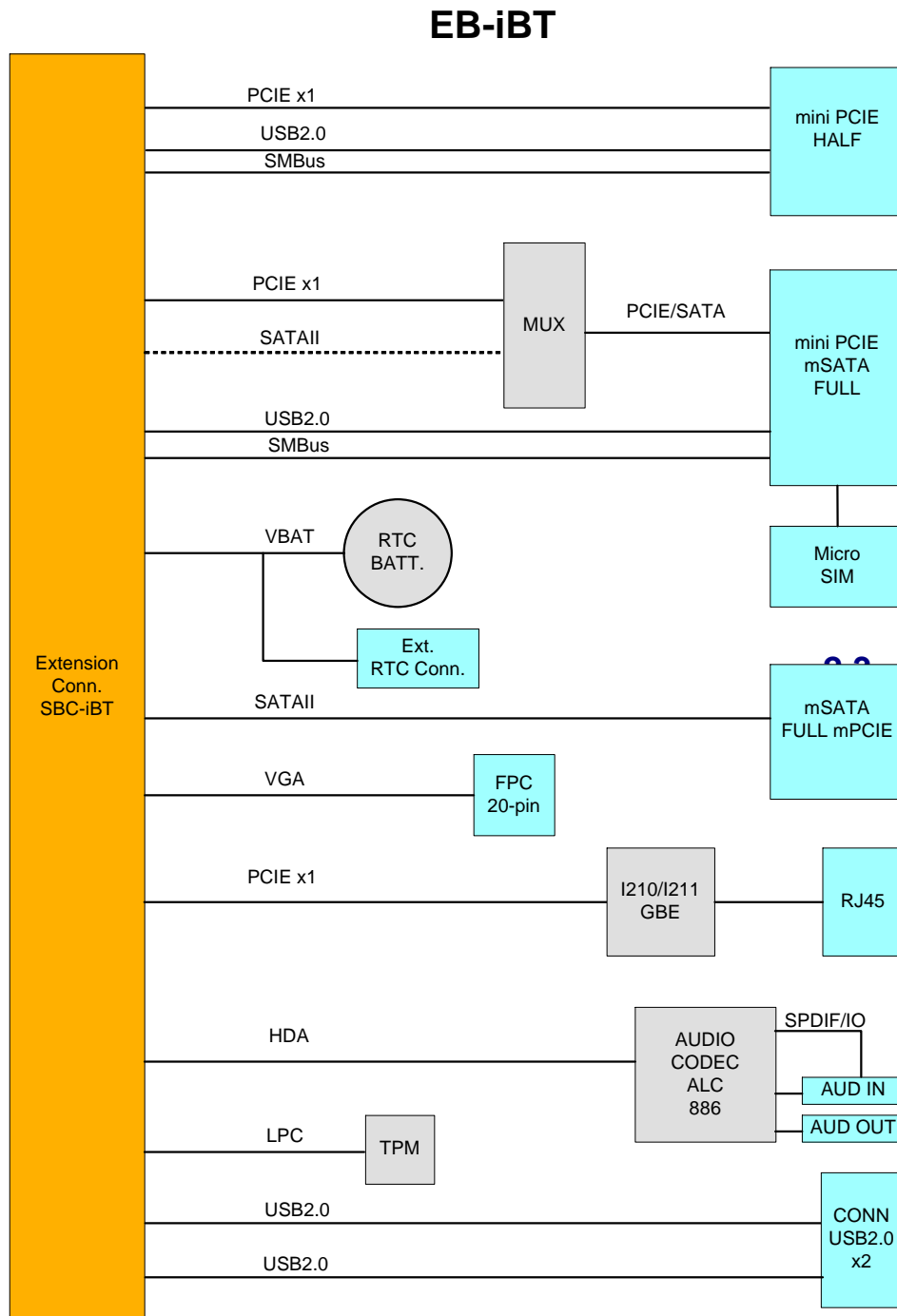
2.1 Highlights

EB-iBT is an extension board used to expand available IO on the iBT platform

- VGA output up to 2500 x 1200 @ 60Hz (through FPC connector)
- 1x GbE
- 2 x USB2
- 7.1 Digital audio / 2 CH analog audio /SPDI/F
- 2x Mini PCIe (one is shared with mSATA)
- 2x mSATA (one shared with the internal SBC-iBT's SSD and available when SSD isn't assembled)
- 1x micro SIM slot (using EB-iBT extension)
- 7260- Dual band Intel's WiFi + BT4.0 (using mini-PCIE slot)
- RTC battery
- SATA activity LED
- WWAN,WLAN,BT activity LED
- Compact size 75 x 137 x 19.6 mm

2.2 Block Diagram

Figure 1 EB-iBT Block Diagram



2.3 Features

I/O

Feature	Specifications	Notes
Network	1000 BaseT Ethernet port, activity LEDs, RJ-45 connector	Option [EB-E]
USB	Two USB 2.0 host ports, 480 Mbit/s	
Audio	Analog Stereo line-out and stereo mic-in	[EB-A]
	Digital 7.1 channel S/PDIF (through 3.5mm to RCA adapter)	
mSATA	Two mSATA (one dedicated and one merged with mini-PCIE) When SBC-iBT assembled with option [NSx] only one dedicated mSATA available	
Micro SD	Support bootable micro SD card .Supported in Linux /Win8.x/DOS	
Micro SIM	Micro SIM socket for 3G modem card support. Connected to mini-PCIE half size socket.	
TPM	Trusted Platform Module 1.2 RSA-2048	[EB-T]
RTC battery	Recharged Battery used to support RTC function	
VGA	VGA output through FPC interface and external adapter	
LED	LED indicators for SATA/WLAN/WWAN/BT acitivity	
WiFi +BT	Intel's Dual band 7260 WiFi a/b/g/n/ac+BT4.0 populated into half mini-PCIE socket	[EB-W]

Electrical and Mechanical

Feature	Notes
Power Supply	EB-iBT uses internal voltages provided by SBC-iBT
Power Consumption	2W
Dimensions	7.5cm x 11.6cm x 1.96cm

3 SYSTEM COMPONENTS

3.1 Audio Subsystem

The EB-iBT audio subsystem is implemented with the Realtek ALC888S-VC2 audio codec. The ALC888S-VC2 is a high performance 7.1+2 channel high definition audio codec with an independent S/PDIF output. The codec features ten DAC channels that simultaneously support 7.1 sound playback and an independent stereo output.

The audio codec is connected to the A55E Controller Hub HDA port.

The ALC888S-VC2 supports the following main features:

- Meets premium audio requirements for Microsoft WLP 3.10
- Meets stricter performance requirements for future WLP effective from 01 June 2008
- High-performance DACs with 97dB SNR (A-Weighting), ADCs with 90dB SNR (A-Weighting)
- Ten DAC channels support 16/20/24-bit PCM format for 7.1 sound playback, plus 2 channels of independent stereo sound output (multiple streaming) through the front panel output
- Two stereo ADCs support 16/20/24-bit PCM format recording simultaneously
- All DACs supports 16/20/24-bit, 44.1k/48k/96k/192kHz sample rate
- All ADCs supports 16/20/24-bit, 44.1k/48k/96k/192kHz sample rate
- SPDIF-OUT converter supports 16/20/24-bit, 44.1k/48k/88.2k/96k/192kHz sample rate
- SPDIF-IN converter supports 44.1k/48k/96k/192k Hz sample rate
- Wide range (-80dB ~ +42dB) volume control with 1.5dB resolution of analog to analog mixer gain
- Software selectable boost gain (+10/+20/+30dB) for analog microphone input
- Built-in headphone amplifiers for each re-tasking jack
- Integrates high-pass filter to cancel DC offset generated from digital microphone

3.1.1 Analog Audio

The EB-iBT analog audio sub-system features a stereo line output and a stereo line input implemented with the ALC888S-VC2 codec.

Analog line output is routed to the audio jack P12. Analog line input is routed to the audio jack P13.

Table 3 Audio Characteristics

Parameter	Min	Typical	Max	Unit
Full-Scale Input Voltage				
All Inputs (gain=0dB)	-	1.6	-	Vrms
ADC	-	1.1	-	Vrms
Full-Scale Output Voltage				
DAC	-	1.4	-	Vrms
Headphone Amplifier Output@32	-	1.6	-	Vrms
S/N (A Weighted)				
ADC	-	90	-	dB FSA
DAC	-	96	-	dB FSA
Headphone Amplifier Output@32	-	95	-	dB FSA
THD+N				
ADC	-	-84	-	dB FS
DAC	-	-90	-	dB FS
Headphone Amplifier Output@32	-	-80	-	dB FS
Frequency Response				
ADC	10	-	0.45*Fs	Hz
DAC	0	-	0.45*Fs	Hz
Power Supply Rejection				
Power Supply Rejection	-	-50	-	dB
Total Out-of-Band Noise (28.8kHz~100kHz)	-	-60	-	dB
Amplifier Gain Step	-	1.5	-	dB
Crosstalk Between Input Channels	-	-80	-	dB
Input Impedance (gain=0dB)	-	47	-	K Ω
Output Impedance				
Amplified Output	-	1	-	Ω
Non-amplified Output	-	100	-	Ω

3.1.2 S/PDIF Output

The S/PDIF output is implemented with the ALC888S-VC2 codec. SPDIF-OUT converter supports 16/20/24-bit, 44.1k/48k/88.2k/96k/192kHz sample rates. The S/PDIF output signal is routed to audio jack P12.

3.1.3 S/PDIF Input

The S/PDIF input is implemented with the ALC888S-VC2 codec. SPDIF-IN converter supports 44.1k/48k/96k/192kHz sample rates. The S/PDIF input signal is routed to audio jack P13.

3.2 USB2.0

The EB-iBT features four USB2.0 interfaces from the SBC-iBT:

- Two interfaces are routed to the external USB2.0 port through dual-stacked U50 connector. The down-stream port support High-speed and Full-speed/Low-speed connections.

- Two interfaces are routed to mini-PCIE connectors P6,P7

3.3 Gigabit Ethernet

EB-iBT Gigabit Ethernet interface is implemented with the I211 Intel Gigabit Ethernet controller. The controller is connected to the PCIe interface. Main features:

- PCIE v2.1 (2.5GT/s) x1
- Jumbo frames
- 802.1q Double VLAN support
- IEEE 1588
- Crossover Detection and Auto-Correction
- Wake-on-LAN and remote wake-up support
- Auto-negotiation
- Activity and speed indicator LED controls

Gigabit Ethernet signals are routed to the RJ-45 connector P4.

4 SYSTEM LOGIC

4.1 Power Subsystem

4.1.1 Power Rails

EB-iBT is powered using SBC-iBT power rails

4.1.2 RTC

Extension board (EB-iBT) features 18mAh rechargeable coin cell lithium battery, which maintains the SBC-iBT RTC when the main power supply is not present. The battery is being re-charged whenever SBC-iBT is connected to the main power supply. The back-up battery will sustain the RTC for up to 4 months with no charging. In addition EB-iBT features external RTC connector P18 for connection of external RTC battery pack.

4.2 LEDs

EB-iBT features following LED found on the top side :

- DS1-Green: WLAN LED.
- DS2-Dual LED: Green – BT, Yellow- 3G modem.
- DS3-Green: SATA LED.

5 CONNECTORS

5.1 VGA FPC Connector (P14)

VGA interface is provided through 20-pin FPC connector (P14).

Table 4 FPC P14 connector pin-out

Pin	Signal Name
1	+V5
2	DDC_DATA
3	DDC_CLK
4	+V3.3
5	GND
6	NC
7	NC
8	NC
9	NC
10	GND
11	HSYNC
12	GND
13	VSYNC
14	GND
15	BLUE
16	GND
17	GREEN
18	GND
19	RED
20	GND

Table 5 P14 connector data

Manufacturer	Mfg. P/N	Mating cable
CVILux	CF20-201D0R0	Terminals: CVILux FFCE2008T115000-300

Compulab provides adapter from FPC to standard DB15 VGA connector

Table 6 FPC to VGA adapter

Manufacturer	Mfg. P/N
Compulab	503R010100

5.2 USB 2.0 Host Connectors (U50)

The EB-iBT USB2.0 host ports are available through a dual-stacked USB 2.0 standard type-A connector (U50).

5.3 Gigabit Ethernet Connector (P4)

The SBC-iBT Gigabit Ethernet port is routed to the standard RJ-45 connector (P26).

5.4 External RTC connector (P18)

The EB-iBT features connector for the external RTC battery.

Table 7 P18 connector pin-out

Pin	Signal Name
1	GND
2	+VCCRTC (2.6-3.1V)

Table 8 P18 connector data

Manufacturer	Mfg. P/N	Mating parts
Molex	53261-0271	Terminals: Molex P/N 50058-8000 Housing Molex P/N 51021-0200 Wires UL1571 AWG#30

CompuLab provides assembled pack:

Table 9 External battery pack

Manufacturer	Mfg. P/N	Description
CompuLab	507A010010M	Assembled Battery, BR1632A, High Temp, 3V/120mA, 2 wire, W2B connector

5.5 Mini-PCIE and mSATA

The EB-iBT features two tree mini-PCIE connector:

- P6 - half mini standards : supports mini-PCIE
- P7 - full mini PCIE standards: supports mini-PCIE and mSATA (when SBC-iBT has no internal SSD). Switching between mini-PCIE and mSATA is controlled through BIOS. The default is mini-PCIE.
- P10 – full mini PCIE standards : supports mSATA only – always available

Table 10 P6 connector pin-out (half mini-PCIE)

Pin	Signal Name	Pin	Signal Name
1	WAKE#	2	+3.3V_SBY
3	NC	4	GND
5	NC	6	+1.5V
7	NC	8	NC
9	GND	10	NC
11	REFCLK-	12	NC
13	REFCLK+	14	NC
15	GND	16	NC
17	NC	18	GND
19	NC	20	NC
21	GND	22	RESET#
23	PCIE_RX-	24	+3.3V_SBY
25	PCIE_RX+	26	GND
27	GND	28	+1.5V
29	GND	30	NC
31	PCIE_TX-	32	NC
33	PCIE_TX+	34	GND
35	GND	36	USB-
37	NC	38	USB+
39	NC	40	GND
41	+3.3V_SBY	42	LED_WWAN#
43	+3.3V_SBY	44	LED_WLAN#
45	NC	46	LED_BT#
47	NC	48	+1.5V
49	NC	50	GND
51	NC	52	+3.3V_SBY

Table 11 P7 connector pin-out (full mini-PCIE / mSATA)

Pin	Signal Name	Pin	Signal Name
1	WAKE#	2	+3.3V
3	NC	4	GND
5	NC	6	+1.5V
7	NC	8	SIM_VCC
9	GND	10	SIM_IO
11	REFCLK-	12	SIM_CLK
13	REFCLK+	14	SIM_RST
15	GND	16	SIM_VPP
17	NC	18	GND
19	NC	20	NC
21	GND	22	RESET#
23	PCIE_RX-/SATA_RX+	24	+3.3V
25	PCIE_RX+/SATA_RX-	26	GND
27	GND	28	+1.5V
29	GND	30	NC
31	PCIE_TX-/SATA_TX-	32	NC
33	PCIE_TX+/SATA_TX+	34	GND
35	GND	36	USB-
37	NC	38	USB+
39	NC	40	GND
41	+3.3V	42	LED_WWAN#
43	+3.3V	44	LED_WLAN#
45	NC	46	LED_BT#
47	NC	48	+1.5V
49	NC	50	GND
51	NC	52	+3.3V

Table 12 P10 connector pin-out (mSATA)

Pin	Signal Name	Pin	Signal Name
1	WAKE#	2	+3.3V
3	NC	4	GND
5	NC	6	+1.5V
7	NC	8	NC
9	GND	10	NC
11	NC	12	NC
13	NC	14	NC
15	GND	16	NC
17	NC	18	GND
19	NC	20	NC
21	GND	22	RESET#
23	SATA_RX+	24	+3.3V
25	SATA_RX-	26	GND
27	GND	28	+1.5V
29	GND	30	NC
31	SATA_TX-	32	NC
33	SATA_TX+	34	GND
35	GND	36	NC
37	NC	38	NC
39	NC	40	GND
41	+3.3V	42	NC
43	+3.3V	44	NC
45	NC	46	NC
47	NC	48	+1.5V
49	NC	50	GND
51	NC	52	+3.3V(S0)

5.6 Micro SIM slot

The EB-iBT features standard micro-SIM connector routed to the P7 mini-PCIE and used to support 3G modem cards with external SIM slot:

Table 13 Micro SIM connector pin-out

Pin	Signal Name
1	VCC
2	RESET
3	CLOCK
4	NC
5	GND
6	VPP
7	IO
8	NC

5.7 Micro SD slot

The EB-iBT features micro-SIM connector connected to the P7 mini-PCIE and used to support 3G modem cards with external SIM slot:

Table 14 Micro SD connector pin-out

Pin	Signal Name
1	DAT2
2	DAT3
3	CMD
4	VDD (3.3V)
5	CLK
6	VSS(GND)
7	DAT0
8	DAT1

6 MECHANICAL DRAWINGS

The mechanical drawings below are provided for connector location information.

Full mechanical drawings are available at www.compulab.co.il/products/sbcs/sbc-ibt/#devres

Figure 2 EB-iBT top

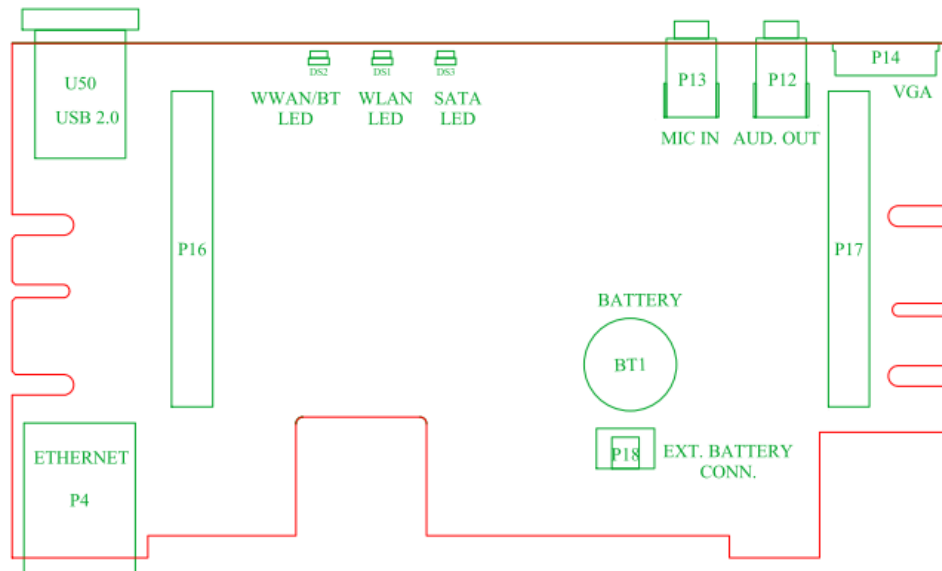


Figure 3 EB-iBT extension board bottom (x-ray view - as seen from top side)

