DIMM-Eco-Base Tarion

HiCO.DIMM compliant baseboard

Hardware Description

Rev3 / 18.03.2015

emtrion GmbH

Revision: **3 / 18.03.2015**

Rev	Date/Signature	Changes
1	05.05.2014/Ko	First revision
2	21.05.2014/Ko	J24 Description Changed, USB OTG description changed, SATA description added, some format changes
3	18.03.2015/Sk	Updates for Revision 2 Boards

emtrion
embedded systems

Table of Content

1 Introduction

DIMM-Eco-Base Tarion is an advancement of the DIMM-Eco-Base Cadun to support Core modules with High Speed Interfaces like PCI Express Mini Card. Also a LVDS interface is added to provide two display interfaces. Another improvement is that DIMM-Eco-Base Tarion supports the Glyn Family Connector for a direct connection of a Glyn display without hardware fittings. The board currently supports several Core modules: DIMM-SH7723, DIMM-SH7724, DIMM-EMEV2, DIMM-MX257, DIMM-MX53x, DIMM-AM335x and DIMM-MX6x.

DIMM-Eco-Base Tarion is intended to be used as a development platform and demonstrates the capabilities of the emtrion Core modules, as well as the advantages of the DIMM interface. It may also be used in series products. Tarion provides the important connectors that are needed to make use of the Core module's feature set.

This Hardware manual describes the physical and electrical characteristics of the board. It covers the use of Tarion with all supported Core modules but only gives additional details that are specific to the base. For this reason, it has to be used together with the manuals of the Core.

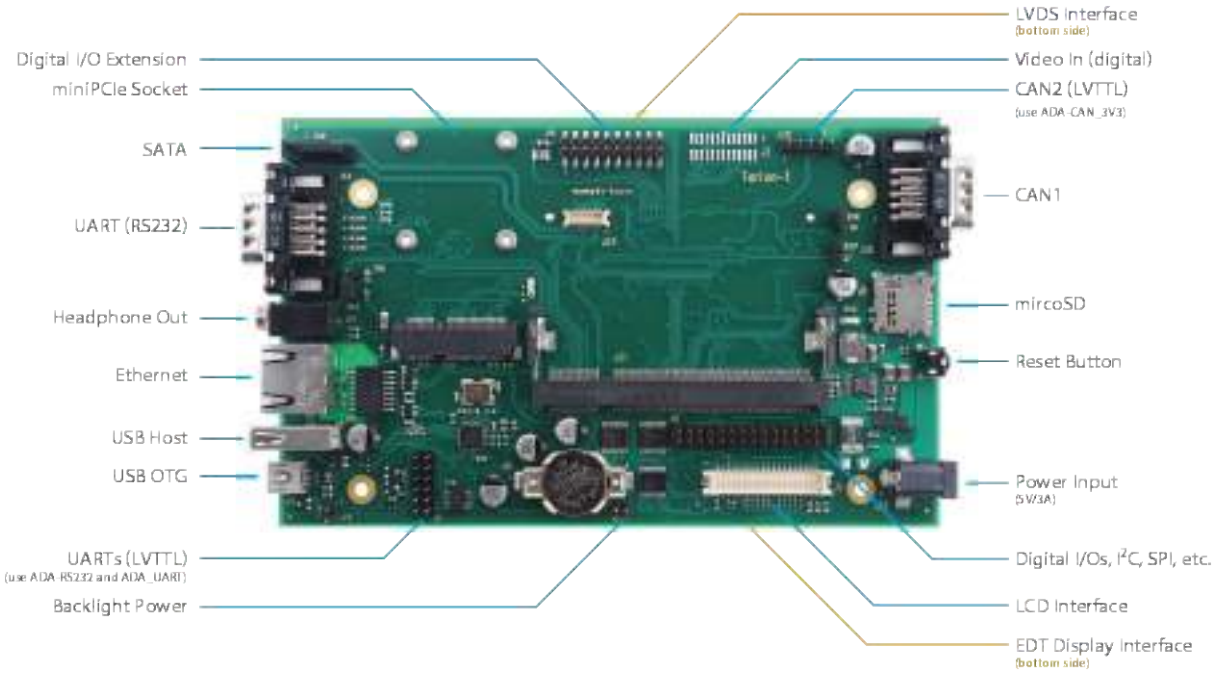
Most interfaces of the Tarion base board are common to all Core modules. Relevant differences between these boards are explicitly mentioned in this manual.

2 Overview functions

Feature	DIMM-Module					
	MX257	MX53x	AM335x	MX6	MX6-PCIe	RZ
SODIMM-Connector						
Ethernet	X	X	X	X	X	X
USB Host	X	X	X	X	X	X
USB Device/OTG	X/-	X/X	X/-	X/X	X/X	X/-
TFT Display (generic)	X	X	X	X	X	X
Touch resistive (4W)	X	X	X	X	X	X
Touch CAP	X	X	X	X	X	X
CMOS Camera Input	X[1]	X[1]	-	X[1]	X[1]	X[1]
Analog Input	1	-	1	-	-	1
Audio Output	X	X	X	X	X	X
µSD-Card	X	X	X	X	X	X
SPI	1	2	1	2	2	2
I²C	X	X	X	X	X	X
UART RS232/LVTTL	1/3	1/4	1/4	1/4	1/4	1/3
CAN1	X	X	X	X	X	X
CAN2 (LVTTL)/2xGPIO	X	X	X	X	X	X
GPIO	8	10	8	10	10	10
GPIO via I²C-Expander	15	15	15	15	15	15
BAT	X	X	X	X	X	X
SODIMM Extension 2						
HDMI/ Keypad/PCIe	-/-/-	-/X/-	-/-/-	X/-/-	-/-/X	-/-/-
LVDS	-	X	-	X	X	X
Touch Res	-	X	-	X	X	X
Touch CAP	-	X	-	X	X	X
SATA	-	X	-	X	X	-

[1] this Interface is not fitted in the standard variant. Ask emtrion for further information.

3 Connector Overview



4 Handling Precautions

Please read the following notes prior to installing CPU module to the Tarion base board. They apply to all ESD (electrostatic discharge) sensitive components:

- Before installing a CPU module the Tarion base board needs to be configured depending on the used CPU module. Further information can be found later in this document.
- Before touching the base board it is recommended that you discharge yourself by touching a grounded object.
- Be sure all tools required for installation are electrostatic discharged as well.
- Before installing (or removing) a CPU module, unplug the power cable from your mains supply.
- Also switch off the power supply before plug or unplug cables at not ESD protected connectors.
- Handle the board with care and try to avoid touching its components or tracks.

5 First Configuration

Before installing a CPU module do the following configuration:

5.1 Ethernet

Because of different Ethernet Controllers the voltage for the LAN transformer must be configured depending on the used CPU module. This can be done with the jumper J31 near the RS232 connector.

The following table shows the jumper position:

CPU module	Position
DIMM_SH7723	1V8
DIMM_SH7724	3V3
DIMM_MX257	3V3
DIMM_MX53x	3V3
DIMM_EMEV2	1V8
DIMM_AM335x	3V3
DIMM_MX6x	3V3
DIMM_RZ	3V3

6 Functional Description

6.1 List of features

The DIMM-Eco-Base Tarion provides the following interfaces and functions. Depending to the used CPU module there will be some differences which are described later in the document.

- 200 pin SODIMM connector for processor modules
- 10/100Base-Tx Ethernet interface at RJ45 jack
- 1 x PCI Express Mini Card Slot for plugging half and full sized modules; for special modules there has been added a SIM Card Holder *1 *2
- 1 x SATA
- 1 x USB 2.0 OTG *2 Device interface at Type-MINI A/B jack
- 1 x USB 2.0 Host interface at Type-A jack
- 1 x generic display interface for TFT displays with 18bpp including interfaces for 4-wire resistive and capacitive touch screens. This interface is available on an DF13 and on an EDT Display connector. You could either use the DF13 or the EDT connector.
- 1 x LVDS interface *2
- switched 5 Volt power source for display backlight
- 1 x generic camera interface for CMOS cameras *1 *2
- 1 x analog audio with stereo headphone output at 3.5mm audio jack
- 1 x micro SD-Card socket
- 5 x serial port, one as RS232 at D-SUB-9 jack, the other as LVTTL *2
- 1 x CAN DSUB-9 connector, depending on the CPU module *2
- 1 x CAN Connector for a (LVTTL) channel, depending on the CPU module *2
- 30 pin header with the following features for SPI, I2C, analog input and GPIOs
    - 2 x SPI Interface *2
    - 1 x I2C Interface
    - 1 x Analog Input
    - 5 x GPIO from SODIMM
- 16-Bit I2C-I/O-Expander for 15 GPIO's
- I2C revision EEPROM
- Spread Spectrum Oscillator *1
- 1 reset button
- Battery holder for RTC backup, CR1632
- Power jack +5V

*1 this Interface is not fitted in the standard variant. Ask emtrion for further information.
*2 this Feature is only available with special CPU modules. Ask emtrion for further information.

6.2 Features and specificities

Most of the features which are available with Tarion are described in the Core module hardware documentation because the base board only provides the connectors.

Feature	DIMM-SH7723	DIMM-SH7724	DIMM-MX257	DIMM-MX53x	DIMM_EMEV2	DIMM-AM335x	DIMM-MX6x
Ethernet	Core	Core	Core	Core	Core	Core	Core
USB 2.0 Host	Core	Core	Core	Core	Core	Core	Core
USB 2.0 Device\OTG	Core\ n/a	Core\ n/a	Core*7 \ n/a	Core*7 \ Core	Core \ n/a	Core*7 \ n/a	Core*7 \ Core
TFT Display (generic)	Core	Core	Core	Core	Core	Core	Core
miniPCIe	n/a	n/a	n/a	n/a	n/a	n/a	Core *1
SATA	n/a	n/a	n/a	Core	n/a	n/a	Core
LVDS	n/a	n/a	n/a	Core	n/a	n/a	Core
Touch Screen	Core	Core	Core	Core	Core	Core	Core
Camera Input *1	Core	Core	Optional*3	Core	Core	n/a	Core
Analog Audio	Base	Base	Base	Base	Base	Base	Base
microSD-Card Socket	Core	Core	Core	Core	Core	Core	Core
UART (-A) RS232	Core	Core	Core	Core	Core	Core	Core
UART (-B, -C, -D, -E) LVTTL	4 ports Core	3 ports Core	3 ports Core	4 ports Core	3 ports Core	3 ports Core	4 ports Core
IrDA	Core	Core	3 ports Core	4 ports Core	n/a	n/a	4 ports Core
CAN	n/a	1 port Core	1 port Core	1 port Core*6	1 port Core	1 port Core	1 port Core
CAN (LVTTL)	n/a	n/a	1 port Core	1 port Core	n/a	1 port Core	1 port Core
SPI	Core	Core	Core	Core	Core	Core	Core
I²C	Core	Core	Core	Core	Core	Core	Core
GPIO	15 + 5 GPIOs*4	15 + 5 GPIOs*4	15+ 5 GPIOs*4	15+ 5 GPIOs*4	15 + 5 GPIOs*4	15+ 5 GPIOs*4	15+ 5 GPIOs*4
Analog Inputs	1 input Core	n/a	1 input Core	n/a	1 input Core	1 input Core	n/a

Spread Spectrum oscillator *[1]	Base*[5]	Base*[5]	n/a	Base*[5]	Base*[5]	n/a	Base*[5]

Legend:
"Core": feature from the Core module; please refer to the Cores hardware documentation to know how to use it.
"Base": feature is specific to the Tarion base board; all information on how to use it are given in the present manual
"n/a": not applicable; this feature is not available with the specified Core module

*[1] this Interface is not fitted in the standard variant. Ask emtrion for further information.

*[3] please ask emtrion for more information.

*[4] 15 GPIO's are realized on the base, via a GPIO Expander. The others are Core module dependent.

*[5] Spread spectrum oscillator is located on the base and clock signal is routed to the Core module.

*[6] CAN is only supported by the DIMM-MX537 and not by DIMM-MX535.

*[7] if needed an USB Host can be realized on that interface. Please contact emtrion for more information

6.3 DIMM interface, J21

The DIMM interface is a standardized interface between the DIMM CPU boards from emtrion and carrier boards. The interface consists of a 200 pin SODIMM connector with 2.5V keying which is commonly used for DDR1 memory modules [1].

Most of the peripheral functions of the CPU boards and a memory bus interface are available at this connection. Also power is supplied via the SODIMM interface. Mechanical characteristics and a general pinout specification can be found later in this document. Individual differences of the CPU boards can be found in their appropriate manuals.

Note:
The pin assignment is specific for the emtrion boards and must not be used for other boards.

6.4 SODIMM Extension Connector, J12

The Interfaces from the SODIMM has been extended with this connector. This Connector is used for High Speed Interfaces from the CPU Module like SATA, LVDS and PCIe.

6.5 PCI Express Mini Card, J30

On the DIMM Base Tarion there is a Slot available for connecting half sized or full sized PCI Express Mini Card Modules.

The connector provides one PCIe Lane, USB-Host, I^2C, SIM and 3.3V and 1.5V power supply.

The SIM Slot is not fitted in the standard variant.

Caution!
Don't connect a module with HDMI function when plugging a PCIe module.

6.6 Ethernet, J32

A 10/100 MBit TX Ethernet interface is available via the RJ45 jack J32. The jack has a separated magnetic whose DC level can be sourced by 1.8V or 3.3V. The supply voltage must be configured by the jumper J31 depending on the used CPU module:

CPU module	Voltage
DIMM_SH7723	1.8V
DIMM_SH7724	3.3V
DIMM_MX257	3.3V
DIMM_MX53x	3.3V
DIMM_EMEV2	1.8V
DIMM_AM335x	3.3V
DIMM_MX6x	3.3V
DIMM_RZ	3.3V

Two LEDs show the signal traffic (LINK_LED#, green) and 100 MBit transfer speed (SPEED_LED#, yellow).

6.7 USB Host, J18

The USB Host interface of the CPU board is connected to the USB Type-A connector J18. The used EMC filters are dimensioned for High Speed Mode with 480 MBaud.

The USB Host and the USB of the miniPCIe connector are connected via an USB hub and use the same USB port of the SODIMM connector. The following table shows which USB interface is connected to which port of the USB hub.

USB Hub Port	Connector	Function
1	USB 2.0 Host	USB 2.0
2	miniPCIe Socket	USB 2.0

The VBUS output of the USB Host connector is controlled by an USB power switch. It can provide up to 5W.

The USB power switch can be controlled by the CPU module by the signal *USBH_PEN#*. Low switches the power on, a high (default) disables it. An overcurrent is reported to the CPU by the signal *USBH_OC#*. Low indicates an overcurrent. High indicates no overcurrent (default).

The two control signals and the switched VBUS signal are routed to the SODIM connector. The VBUS signal to the SODIMM connector is not a power supply. The DIMM module has the possibility to check the availability of VBUS.

6.8 SATA, J26

A standard SATA data connector is available on the Tarion Baseboard. The differential data pairs are routed from the SODIMM Extension Connector 2 (J12) to the SATA Connector J26.

The chapter Features and specificities shows which CPU modules support the SATA interface.

6.9 USB Device/OTG, J28

The USB device interface is available at the USB Mini A/B connector J28. The used EMC filters are dimensioned for High Speed Mode with 480MBaud. All other characteristics are dependent on the CPU module. The USB data signals and the VBUS signal are routed to the SODIMM connector.

The Tarion baseboard also provides USB OTG functionality on this port. To use USB OTG the jumper on J29 must not be plugged. Then the USBOTG_ID Pin can enable (low) or disable (high or floating) the Power for the VBUS Pin. VBUS is only supplied if USB_OTG_PEN# signal is low.

If J28 should be used only in Host Mode J29 should be plugged. Then VBUS is controlled only by USBOTG_PEN# signal.

The USBOTG_VBUS is a signal with 5V level and is routed to the SODIMM connector to allow modules to check if USB power is good.

Net Name	SODIMM
USBOTG_OC#	GPIO_6
USBOTG_ID	GPIO_5
USBOTG_VBUS	USBF_VBUS

For CPU modules which want to use USB Host and USB Device but do not have a specific USB OTG Function Block integrated the USBOTG_VBUS Signal has been modified. The CPU could only operate as USB Device if an external power supply (VBUS High) is connected. In this case the USBOTG_ID pin is internally pulled high and a 5 V Signal is applied to the USBOTG_VBUS pin of the DIMM connector. If the Tarion should operate in Host Mode the ID pin is shorten to GND by an external adapter. In this Case the USBOTG_VBUS Pin is pulled Low for signaling the CPU that no device Mode is supported. The Benefit is that CPUs without an OTG function block could switch the port function in a secure way by simply checking the USBOTG_VBUS signal.

Note:
The USB OTG feature is not available on all CPU modules. Ask emtrion for further information.

6.10 Graphic Output

The Tarion baseboard supports a generic interface for TFT displays with RGB or 80-Series interface. If supported by the used core module also a LVDS interface is available.

The LCD interface is limited to 18bpp color depth. Other parameters, like resolution or clocks, are dependent on the used CPU module. The baseboard provides a connector for the emtrion standard displays as well as an EDT Connector for displays of the Glyn Display Family.

The color mapping depends on the CPU module and is described the respective manuals.

The following table shows how to configure the LCD_DCK Signal of the SODIMM Interface depending on the display:

Display Typ	Art Nr	LCD_DCK
GLYN EDT	11188	Rising edge
Displayeinheit WVGA Res	10955	Falling edge
Displayeinheit WVGA Kap	11167	Falling Edge

6.10.1 Generic Display Interface, J1

The display interface J1 is a generic DF13-40 type connector that includes all signals needed to connect TFT displays with 18 bit color depth. It also includes signals for a 4-wire touch screen interface and an I2C interface.

The touch signals are shared with the LVDS connector J25 and can be used either by the LVDS interface or the TFT RGB interface. Using it on both interfaces will cause malfunctions of the touch interface.

Please ask emtrion for a list of supported displays.

6.10.2 EDT Interface, J33

The EDT Interface uses the same signals as the generic display interface J1.

In the standard variant the capacitive touch interface is routed to the connector. It is also possible to connect a 4 wire resistive touch interface to this connector.

The LCD_VCPWC (SODIMM pin 74) is used for controlling the reset function if the display. The LCD_VEPWC (SODIMM pin 76) is used for controlling the wake signal on the display.

You can get more information on the family concept on the following link:

http://www.glyn.com/Products/Displays/Product-Highlights/TFT-Family-Concept

Note:
If you like emtrion to support another display ask emtrion for further information.

6.10.3 Backlight Supply, J5

The connector J5 is a 2 pin header which is intended to supply the power for the backlight of the connected generic TFT display. J5 is connected via a power switch to the +5V voltage. The power switch is controlled by the *LCD_DON* signal at pin 72 of the SODIMM connector. The supply is enabled if *LCD_DON* is high. Otherwise it is disabled.

6.10.4 Spread Spectrum Oscillator

Normally the CPU clock is used as clock source for the LCD controller. But often displays have a big influence in EMC tests. Therefore a spread spectrum oscillator is provided on the Tarion board. A spread spectrum oscillator spreads the clock frequency in a specific domain, resulting in a signal with a wider bandwidth.

As default the Tarion provides a 32MHz clock, which is spread by +/- 1.4%, at the SODIMM interface. The DIMM-SH7723, DIMM-SH7724 and DIMM-MX53x CPU modules can use this clock as external input for the LCD controller. Using the DIMM-MX257 this function is not available. Please ask emtrion if other external clock frequencies are needed.

The switching between internal and external LCD clock can be done by software.

The spread spectrum oscillator is not fitted in the standard variant.

6.10.5 Generic LVDS Interface, J25

The LVDS connector J25 is a generic interface for LVDS signals to drive LVDS displays. Between the clock and the four data pairs the I^2C bus and the signals for a resistive touch screen are available.

The connector also provides +3.3V and 5V (each 500mA max.).

The touch signals are shared with the RGB connectors J1 and J33. They can be used either by the LVDS interface or one of the TFT RGB interfaces. If used by both interfaces this will cause malfunctions of the touch interface.

6.11 Camera Interface, J2

The VIO1 interface of the SODIMM interface can be used as a generic interface where a CMOS camera module can be connected.

The camera interface is routed as the generic interface to a 26 pin header J2 to connect CMOS camera modules. It includes the 4:2:2 YCbCr interface with data and control signals, an I^2C-Bus, power down and reset signals and the supply voltages 3.3 V and 5 V.

The reset signal is connected to global reset. If the used camera modules support the power down function, they can be powered down by the SODIMM signal *PWRDWN_CAM*.

PWRDWN_CAM	Mode
0	Running (default)
1	Powered down

Note:
This Interface is not fitted in the standard variant.
Please ask emtrion for details of supported CMOS camera modules.

6.12 Analog Audio, J19

The DIMM-Eco-Base Tarion provides the high performance audio codec TLV320AIC23 [2]. The digital audio interface is connected to the SODIMM connector; and the chip is controlled via the I^2C-Bus (chip address 0x1B).

The codec provides a stereo headphone output (30mW into a 32 Ω load) at the 3.5mm audio jack J19.

6.13 MicroSD-Card Socket, J8

A microSD-Card socket J8 is available. All signals are directly connected to the SODIMM interface SDC1 without any further provisions. Thus the characteristics are dependent on the used CPU board. The write protect signal of the SDC1 interface is connected to GND, so the microSD-Card is always writeable.

6.14 CAN Interfaces, J20 and J15

The Tarion baseboard supports two CAN channels, as many of emtrion's CPU modules provide CAN controllers with up to two channels.

The following CPU modules supports CAN:

CPU module	CAN CH1	CAN CH2
DIMM-SH7723	n/a	n/a
DIMM-SH7724	Yes	n/a
DIMM-MX257	Yes	Yes

DIMM-MX537	Yes	Yes
DIMM-EMEV2	Yes	n/a
DIMM-AM335x	Yes	Yes
DIMM-MX6x	Yes	Yes
DIMM-RZ	Yes	Yes

6.14.1 CAN1 Interface, J15

The CAN channel 1 is routed to D-SUB connector J15. A high-speed CAN transceiver is realized on the base, so that the CAN interface can directly connected to a CAN network. If this interface is an endpoint a 120Ω resistor can be included by setting a jumper on connector J6.

6.14.2 CAN2 Interface, J20

The transmit and receive signals of CAN channel 2 are routed together with 3.3V and GND to the pin header J20. The signals have LVTTL level without a CAN transceiver.

Note:
Ask emtrion for an adapter with integrated transceiver and D-SUB connector for CAN channel 2.

If CAN2 is not used the TX and RX pins may be used as GPIOs.

6.15 Serial Ports, J11 and J14

The DIMM-Eco-Base Tarion supports up to 5 serial ports, depending on the used CPU module. The ports are named UART_A to UART_E.

UART_A is available at the D-SUB jack J14 as standard RS232 interfaces. UART_B, UART_C, UART_D and UART_E are provided as LVTTL level signals on pin header J11. The LVTTL signals can be adapted to the customer's needs by adding the appropriate signal drivers (e.g. RS232, RS548, RS422 etc.). By using the adapter cable ADA_RS232 from emtrion the LVTTL signals also can be used as RS232 interface.

DIMM-SH7723:

Port	Level	Handshake	CPU-IF	Remarks
UART_A	RS232	RTS, CTS	SCIF3	RS232 transceiver on CPU module
UART_B	LVTTL	-	SCIF5	
UART_C	LVTTL	-	SCIF4	
UART_D	LVTTL	-	SCIF2	
UART_E	LVTTL	-	SCIF1	

DIMM-SH7724:

Port	Level	Handshake	CPU-IF	Remarks
UART_A	RS232	RTS, CTS	SCIF3	RS232 transceiver on CPU module
UART_B	LVTTL	-	SCIF4	
(UART_C)	LVTTL	-	SCIF5	optional
UART_D	LVTTL	-	SCIF2	
UART_E	LVTTL	-	SCIF0	

DIMM-MX257:

Port	Level	Handshake	CPU-IF	Remarks
UART_A	RS232	RTS, CTS	UART1	RS232 transceiver on CPU module
UART_B	LVTTL	-	UART3	
UART_D	LVTTL	-	UART5	
UART_E	LVTTL	-	UART2	

DIMM-MX53x:

Port	Level	Handshake	CPU-IF	Remarks
UART_A	RS232	RTS, CTS	UART1	RS232 transceiver on CPU module
UART_B	LVTTL	-	UART3	
UART_C	LVTTL	-	UART4	
UART_D	LVTTL	-	UART5	
UART_E	LVTTL	-	UART2	

DIMM-EMEV2:

Port	Level	Handshake	CPU-IF	Remarks
UART_A	RS232	RTS, CTS	UART0	RS232 transceiver on CPU module
UART_B	LVTTL	-	UART1	
UART_C	LVTTL	-	UART2	
UART_D	LVTTL	-	UART3	

DIMM-AM335x:

Port	Level	Handshake	CPU-IF	Remarks
UART_A	RS232	RTS, CTS	UART0	RS232 transceiver on CPU module
UART_B	LVTTL	-	UART1	
UART_C	LVTTL	-	UART4	
UART_D	LVTTL	-	UART3	
UART_E	LVTTL	RTS, CTS	UART3	

DIMM-MX6x:

Port	Level	Handshake	CPU-IF	Remarks
UART_A	RS232	RTS, CTS	UART2	RS232 transceiver on CPU module
UART_B	LVTTL	-	UART1	
UART_C	LVTTL	-	UART3	
UART_D	LVTTL	-	UART4	
UART_E	LVTTL	-	UART5	

6.16 IrDA Ports

Each UART LVTTL port of DIMM-MX257, DIMM-MX53x and DIMM-MX6x can also be used as low speed Infrared port (IrDA v1.0). The IrDA ports are available on the pin header J11, if the port is not used as UART port. The UART and IrDA ports use the same transmit and receive signals.

DIMM-MX257:

Port	Level	CPU-IF
UART_B	LVTTL	IrDA3
UART_D	LVTTL	IrDA5

UART_E	LVTTL	IrDA2

DIMM-MX53x:

Port	Level	CPU-IF
UART_B	LVTTL	IrDA3
UART_C	LVTTL	IrDA4
UART_D	LVTTL	IrDA5
UART_E	LVTTL	IrDA2

DIMM-MX6x:

Port	Level	CPU-IF
UART_B	LVTTL	IrDA1
UART_C	LVTTL	IrDA3
UART_D	LVTTL	IrDA4
UART_E	LVTTL	IrDA5

The DIMM-SH7723 and the DIMM-SH7724 support IrDA v1.2a. The IrDA signals of these modules use the SODIMM GPIO pins GPIO_8 (RXD) and GPIO_9 (TXD).

6.17 I/O Extension, J12

The 30 pin header J12 includes up to 4 GPIOs, two SPI interfaces, an I²C-Bus interface and one analog input pin.

The I²C-Bus interface is decoupled to the onboard bus devices via a repeater circuit. The analog input as a 100Ω series resistance. All other signals are directly connected with the SODIMM connector. Their individual characteristics depend on the used CPU board. See the connector description later in this manual.

6.18 I²C Bus

At the DIMM-Eco-Base Tarion are several I²C-Bus clients:

Device	Slave	Chip Address (7Bit)
Audio Codec	TLV320AIC23	0x1B
16Bit I/O-Expander	PCA9555	0x26
EEPROM board revision	24LC01B	0x51
Generic LCD Interface	PCA8574APW PCA9530	0x3A 0x60
EDT display Interface	Touch Controller	Depends on used Touch Controller
LVDS Interface	Touch Controller	Depends on used Touch Controller
miniPCIe	miniPCIe - Module	Depends on used Module
Camera Interface	CAM-IF	Depends on used camera

Further addresses are allocated by I²C devices used at the CPU modules. Please refer to the hardware manual of the used CPU module.

6.19 I²C Revision EEPROM

The CPU module can detect the type and revision of the base board by reading an EEPROM connected to the I²C bus. The 7-Bit address is 0x51. The write protection of the EEPROM is controlled by the jumper J7. If the jumper is not plugged the EEPROM is write protected. If the jumper is plugged, the EEPROM is writeable.

The DIMM-ECOBase Tarion Baseboard Type is 0xC6.

6.20 I²C GPIO Extension, J16

A 16bit I²C GPIO expander is connected to the I²C bus. The 7-Bit address is 0x26. 15 GPIO's (Port0[7:0] and Port1[6:0]) are routed to the GPIO connector J16. The GPIOs can assert an interrupt via the signal GPIO_IRQ# which is routed to Pin 184 of J21. One expander pin (Port1[7]) is used for Tarion internal function.

Port1[7]: 12MHz clock disable:

This signal can disable the 12MHz audio clock. If this signal is low the 12MHz is disabled, if high (default) it is enabled.

6.21 Analog Input, J12

Depending on the CPU module an analog input is available on the I/O extension connector J12. The individual characteristic is dependent on the used CPU board. A 100 Ohm series resistor is applied to the analog input signal.

6.22 Reset Button, S1

A reset button S1 is placed on the DIMM-Eco-Base Tarion. A reset of the CPU module (e.g. by a software reset) also resets the Tarion base board.

A reset is only asserted if the reset button is pressed longer than 3 seconds. Immediately after pressing the button an interrupt (POWER_IRQ) is asserted and the operating system has the option to close the filesystem if necessary before the HW reset asserts.

6.23 Power Supply

The Tarion base board should be supplied by a +5Volt, +/- 5%, max. 5 A, wall adapter. A protection circuit shuts down the power supply if the voltage is out of the range of 4.52V to 5.65V.

On the Tarion there are two 3.3V power rails. The primary 3.3V power rail is routed from the 3.3V DCDC converter to the SODIMM connector. Via the SODIMM signal POWER_BASE_ON the secondary 3.3V power rail is switch on. The Tarion interface components are connected to the secondary 3.3V power rail. They are only supplied, if the CPU module allows it.

This feature is realized to avoid latch up effects at power up and power down.

6.23.1 Onboard Regulators

The DIMM-Eco-Base Tarion has a switching regulator +3,3V (most of the base board functions and the CPU module) and a linear regulators for +1,8V (Ethernet) and +1,5V (miniPCIe).

The 3,3V regulator has a green LED to show the status of the voltage on the board. If the LED is on, the voltage is good.

6.23.2 Power Consumption

The maximum available power for the complete system must not exceed 25W!

Important note:
Please make sure your connected devices like display, USB devices, cameras etc. including the Tarion base board and the CPU module don't exceed the **25 Watt** limit! Otherwise this can damage your system!

6.24 Backup Battery

A battery holder J13 for lithium coin cell CR1632 is available to supply the RTC of the CPU boards.

7 Pin Assignments

7.1 J21, SODIMM connector

Type 200 pin SODIMM socket, 0.6 mm Pitch, 2,5V keying

Pin	Signal	Interface		Signal	Pin
1	SPEED_LED#	Ethernet	USB Host	USBH_PEN#	2
3	ETH_TDP			USBH_OC#	4
5	ETH_TDM			USBH_DM	6
7	GND			USBH_DP	8
9	ETH_RDP		USB Device	USBF_VBUS	10
11	ETH_RDM			USBF_DM	12
13	LINK_LED#			USBF_DP	14
15	USBH_VBUS[1]	USB Host	Power	GND	16
17	CAN1_TX	CAN	UART-A	UART_A_TXD#	18
19	CAN1_RX			UART_A_RXD#	20
21	UART_E_TXD	UART-E		UART_A_RTS#	22
23	UART_E _RXD			UART_A_CTS#	24
25	UART_D_TXD	UART-D	Touch	Touch_XP	26
27	UART_D_RXD			Touch_XM	28
29	UART_C_TXD	UART-C		Touch_YP	30
31	UART_C_RXD			Touch_YM	32
33	UART_B_TXD	UART-B	A/D	ANA1	34
35	UART_B_RXD			n/c	36
37	n/c	A/D		n/c	38
39	+3V3	Power		GND	40
41	n/c	LCD		n/c	42
43	n/c			n/c	44
45	n/c			n/c	46
47	LCD_D16			LCD_D17	48
49	LCD_D14			LCD_D15	50

51	LCD_D12			LCD_D13	**52**
53	LCD_D10			LCD_D11	**54**
55	LCD_D8			LCD_D9	**56**
57	LCD_D6			LCD_D7	**58**
59	LCD_D4			LCD_D5	**60**
61	LCD_D2			LCD_D3	**62**
63	LCD_D0			LCD_D1	**64**
65	+3V3	**Power**		GND	**66**
67	LCDRD#	**LCD**		LCD_LCLK	**68**
69	LCD_DISP			LCD_DCK	**70**
71	LCD_HSYN			LCD_DON	**72**
73	LCD_VSYN			LCD_VCPWC	**74**
75	n/c			LCD_VEPWC	**76**
77	n/c	**VIO**		CAM_D7	**78**
79	n/c			CAM_D6	**80**
81	n/c			CAM_D5	**82**
83	CAM_CLK			CAM_D4	**84**
85	CAM_HD			CAM_D3	**86**
87	CAM_VD			CAM_D2	**88**
89	PWRDWN_CAM			CAM_D1	**90**
91	n/c			CAM_D0	**92**
93	+3V3	**Power**		GND	**94**
95	SPI2_MISO[2]	**SDC2**	**SDC1**	SDC1_D0	**96**
97	n/c			SDC1_D1	**98**
99	n/c			SDC1_D2	**100**
101	SPI2_SS#[2]			SDC1_D3	**102**
103	SPI2_MOSI[2]			SDC1_CMD	**104**
105	SPI2_CLK[2]			SDC1_CLK	**106**
107	n/c			SDC1_CD#	**108**
109	n/c			SDC1_WP# (GND)	**110**
111	SPI1_SS#	**SPI**		SPI1_MISO	**112**

113	SPI1_SCK			SPI1_MOSI	**114**
115	SCL	**I2C**	**Audio**	AUDIO_BCK	**116**
117	SDA			AUDIO_LRC	**118**
119	n/c			AUDIO_DATI	**120**
121	n/c			AUDIO_DATO	**122**
123	GND	**Power**		AUDIO_MCLK	**124**
125	GPIO8/CAN2_RX	**GPIO**		GPIO9/CAN2_TX	**126**
127	GPIO6/USBOTG_OC#			GPIO7	**128**
129	GPIO4/PCIE_DISABLE#			GPIO5/USBOTG_ID#	**130**
131	GPIO2/PCIE_WAKE#			GPIO3/PCIE_RST#	**132**
133	GPIO0			GPIO1	**134**
135	POWER_ON_BASE	**Power**		GND	**136**
137	n/c	**Address A[15:0]**		n/c	**138**
139	n/c			n/c	**140**
141	n/c			n/c	**142**
143	n/c			n/c	**144**
145	n/c			n/c	**146**
147	n/c			n/c	**148**
149	n/c			n/c	**150**
151	n/c			n/c	**152**
153	n/c			n/c	**154**
155	n/c			n/c	**156**
157	n/c			n/c	**158**
159	n/c			n/c	**160**
161	+3V3	**Power**		GND	**162**
163	n/c	**Data D[15:0]**		n/c	**164**
165	n/c			n/c	**166**
167	n/c			n/c	**168**
169	n/c			n/c	**170**
171	n/c			n/c	**172**
173	n/c			n/c	**174**

175	n/c		n/c	**176**
177	n/c		n/c	**178**
179	n/c		n/c	**180**
181	n/c		n/c	**182**
183	n/c		GPIO_IRQ	**184**
185	n/c		POWER_IRQ	**186**
187	n/c		CAP_TOUCH_IRQ#	**188**
189	n/c	**Bus Control**	RESO#	**190**
191	n/c		RESI#	**192**
193	n/c		n/c	**194**
195	n/c		n/c	**196**
197	n/c		n/c	**198**
199	BAT	**Power**	GND	**200**

[1] USBH_VBUS is generated on the Base and it is routed to the Core module that it can be monitored.

[2] Some Modules route a second SPI interface to the SDC2 pins of the SODIMM interface.

7.2 J24, Extension Connector 2

Type: 30 pin connector, Molex 537480308, 0.5 mm pitch

Pin	Signal	Pin	Signal
1	SATA_RXN	2	LVDS_TX2_N
3	SATA_RXP	4	LVDS_TX2_P
5	SATA_TXP	6	LVDS_TX0_P
7	SATA_TXN	8	LVDS_TX0_N
9	GND	10	GND
11	n/c	12	LVDS_TX1_P
13	n/c	14	LVDS_TX1_N
15	PCIE_RX_P	16	GND
17	PCIE_RX_N	18	LVDS_CLK_P
19	PCIE_TX_N	20	LVDS_CLK_N
21	PCIE_TX_P	22	GND
23	PCIE_REFCLK_P	24	LVDS_TX3_P
25	PCIE_REFCLK_N	26	LVDS_TX3_N
27	n/c	28	GND
29	n/c	30	n/c

7.3 J30, miniPCIe Sockel

Type: 52 pin connector, Hirose DF13-40, 0.8 mm pitch

Pin	Signal	Pin	Signal
1	PCIE_WAKE#/GPIO2	2	3V3
3	n/c	4	GND
5	n/c	6	1V5
7	n/c	8	SIM_PWR
9	GND	10	SIM_DATA
11	PCIE_REFCLK_N_2	12	SIM_CLK
13	PCIE_REFCLK_P_2	14	SIM_RESET
15	GND	16	SIM_VPP
17	n/c	18	GND
19	n/c	20	PCIE_DISABLE#/GPIO4
21	GND	22	PCIE_RST#/GPIO3
23	PCIE_RX_N_2	24	3V3
25	PCIE_RX_P_2	26	GND
27	GND	28	1V5
29	GND	30	SCL
31	PCIE_TX_N_2	32	SDA
33	PCIE_TX_P_2	34	GND
35	GND	36	USBH_P2_DM
37	GND	38	USBH_P2_DP
39	3V3	40	GND
41	3V3	42	n/c
43	GND	44	LED_GREEN
45	n/c	46	n/c
47	n/c	48	1V5
49	n/c	50	GND
51	n/c	52	3V3

7.4 J34, SIM Sockel

Type: 7 pin connector, Würth 693 010 020 611

Pin	Signal
1	VCC
2	RES
3	CLK
5	GND
6	VPP
7	IO

7.5 J26, SATA Connector

Type: 7 pin SATA Connector

Pin	Signal
1	GND
2	SATA_TXP
3	SATA_TXP
4	GND
5	SATA_RXN
6	SATA_RXP
7	GND

7.6 J1, Generic TFT Connector

Type: 40 pin connector, Hirose DF13-40, 1.25 mm * 1.25 mm pitch

Pin	Signal	Pin	Signal
1	LCD_VEPWC	2	LCD_VCPWC
3	SDA_LCD	4	SCL_LCD
5	LCD_RD#	6	CAP_TOUCH_IRQ#
7	LCD_VCC	8	LCD_VCC
9	DE	10	GND
11	BLUE5	12	BLUE4
13	BLUE3	14	BLUE2

15	BLUE1	**16**	BLUE0
17	GND	**18**	GREEN5
19	GREEN4	**20**	GREEN3
21	GREEN2	**22**	GREEN1
23	GREEN0	**24**	GND
25	RED5	**26**	RED4
27	RED3	**28**	RED2
29	RED1	**30**	RED0
31	GND	**32**	VSYNC
33	HSYNC	**34**	DOTCLK
35	GND	**36**	LCD_VCC
37	Touch_XP	**38**	Touch_YP
39	Touch_XM	**40**	Touch_YM

7.7 J33, EDT Display Connector

Type: 40 pin connector, Hirose FH12-40, 0,5 mm pitch

Pin	Signal
1	n/c
2	SDA_LCD
3	n/c
4	SCL_LCD
5	LCD_BL_PWM
6	CAP_TOUCH_IRQ#
7	LCD_VCC
8	LCD_VCC
9	GND
10	GND
11	LCD_VCC
12	LCD_DON
13	DE
14	VSYNC
15	HSYNC

16	LCD_VEPWC
17	DOTCLK
18	GND
19	RED0
20	RED1
21	RED2
22	RED3
23	RED4
24	RED5
25	GND
26	GREEN0
27	GREEN1
28	GREEN2
29	GREEN3
30	GREEN4
31	GREEN5
32	GND
33	BLUE0
34	BLUE1
35	BLUE2
36	BLUE3
37	BLUE4
38	BLUE5
39	LCD_VCPWC
40	n/c

7.8 J25, Generic LVDS Connector

Type: 25 pin connector, JAE FI-S25P-HFE, 1,25mm pitch

Pin	Signal
1	+3.3V (500mA max.)
2	+3.3V
3	SCL

4	SDA
5	GND
6	LVDS_TX2_N
7	LVDS_TX2_P
8	GND
9	LVDS_TX0_N
10	LVDS_TX0_P
11	GND
12	LVDS_TX1_N
13	LVDS_TX1_P
14	GND
15	LVDS_CLK_N
16	LVDS_CLK_P
17	GND
18	LVDS_TX3_N
19	LVDS_TX3_P
20	CAP_TOUCH_IRQ#
21	TOUCH_XP
22	TOUCH_XM
23	TOUCH_YP
24	TOUCH_YM
25	+5V (500mA max.)

7.9 J5, Backlight Power Supply

Type: 2 pin header, 2.54 mm pitch

Pin	Signal
1	+5V
2	GND

7.10 J14, UART-A

Type: DSUB-9 male

Pin	Signal	Pin	Signal
1	n/c	6	n/c
2	UART_A_RXD#	7	UART_A_RTS#
3	UART_A_TXD#	8	UART_A_CTS#
4	n/c	9	n/c
5	GND		

7.11 J11, UART-B, C, D, E

Type: 2*6 pin header, 2.54 mm pitch

Pin	Signal	Pin	Signal
1	+3.3V	2	UART_B_RXD*
3	GND	4	UART_B_TXD*
5	UART_E_TXD	6	UART_C_RXD*
7	UART_E_RXD	8	UART_C_TXD*
9	UART_D_TXD	10	GND
11	UART_D_RXD	12	+3.3V

7.12 J8, microSD Sockel

Type: microSD Sockel, 14 Pin

Pin	Signal
1	SDC1_D2
2	SDC1_D3
3	SDC1_CMD
4	3V3
5	SDC1_CLK
6	GND
7	SDC1_D0
8	SDC1_D1
9	SDC1_CD#

10	GND
11	GND
12	GND
13	GND
14	GND

7.13 J2, Generic Camera Connector

Type: 2*13 pin header, 1.27 mm pitch

Pin	Signal	Pin	Signal
1	n/c	**2**	GND
3	+5V	**4**	GND
5	CAM_D0	**6**	CAM_D1
7	CAM_D2	**8**	CAM_D3
9	CAM_D4	**10**	CAM_D5
11	CAM_D6	**12**	CAM_D7
13	GND	**14**	GND
15	CAM_VD	**16**	PWRDOWN_CAM#
17	CAM_HD	**18**	GND
19	CAM_CLK	**20**	RESO#
21	+3.3V	**22**	GND
23	SCL	**24**	SDA
25	+3.3V	**26**	GND

7.14 J15, CAN connector

Type: DSUB-9 male

Pin	Signal	Pin	Signal
1	n/c	**6**	n/c
2	CAN1_L	**7**	CAN1_H
3	GND	**8**	n/c
4	n/c	**9**	n/c
5	n/c		

7.15 J20, CAN LVTTL connector

Type: 1*5 pin header, 2.54 mm pitch

Pin	Signal
1	+3.3V
2	GND
3	CAN2_TX
4	CAN2_RX
5	n/c

7.16 J12, I/O Extension Connector

Type: 2*15 pin header, 2.54 mm pitch

Pin	Signal	Pin	Signal
1	GND	2	+3.3V
3	SPI1_SS#	4	GPIO_0
5	SPI1_SCK	6	GPIO_1
7	SPI1_MISO	8	n/c
9	SPI1_MOSI	10	n/c
11	GND	12	n/c
13	SPI2_SS#	14	n/c
15	SPI2_SCK	16	n/c
17	SPI2_MISO	18	n/c
19	SPI2_MOSI	20	GPIO_8/CAN2_TX
21	GND	22	GPIO_9/CAN2_RX
23	SCL	24	RESO#
25	SDA	26	RESI#
27	GND	28	+3.3V
29	ANA_IN1	30	+3.3V

7.17 J16, GPIO Expander Connector

Type: 2*10 pin header, 2.54 mm pitch

Pin	Signal	Pin	Signal
1	+3.3V	2	GND
3	GPIO_I2C_0	4	GPIO_I2C_8
5	GPIO_I2C_1	6	GPIO_I2C_9
7	GPIO_I2C_2	8	GPIO_I2C_10
9	GPIO_I2C_3	10	GPIO_I2C_11
11	GPIO_I2C_4	12	GPIO_I2C_12
13	GPIO_I2C_5	14	GPIO_I2C_13
15	GPIO_I2C_6	16	GPIO_I2C_14
17	GPIO_I2C_7	18	n/c
19	GND	20	+3.3V

7.18 J32, Ethernet Connector

Type: Rj45 Jack (8 pin)

Pin	Signal
1	ETH_TDP
2	ETH_TDM
3	ETH_RDP
4	Term
5	Term
6	ETH_RDM
7	Term
8	Term
9	LED1_K
10	LED1_A
11	LED2_K
12	LED2_A

7.19 J31, LAN transformer voltage connector

Type: 1*3 pin header, 2.54 mm pitch

Pin	Signal
1	+3.3V
2	LAN_voltage
3	+1.8V

7.20 J18, USB Host Connector

Type: USB A connector (4 pin)

Pin	Signal
1	USBH_VBUS
2	USBH_DM
3	USBH_DP
4	GND

7.21 J28, USB Device Connector

Type: USB mini AB connector (5 pin)

Pin	Signal
1	USBF_VBUS
2	USBF_DM
3	USBF_DP
4	USB_ID
5	GND

7.22 J19, Audio Jack

Type: Audio Jack

Pin	Signal
1	GND
1	LEFT
2	n/c
3	n/c
4	RIGHT

7.23 J13, RTC Battery Holder

Type: Battery Holder for CR1632

Pin	Signal
1	GND
2	BAT +

7.24 J17, DC Power Jack

Type: KLDX-SMT-0202AP

Pin	Signal
Center Pin	+5V
Outer Ring	GND

8 Technical Characteristics

8.1 Electrical Specifications

Electrical Specification	
Supply Voltage	+5V, +/-5%
Current consumption	max. 5A, depending on Core module and connected peripherals

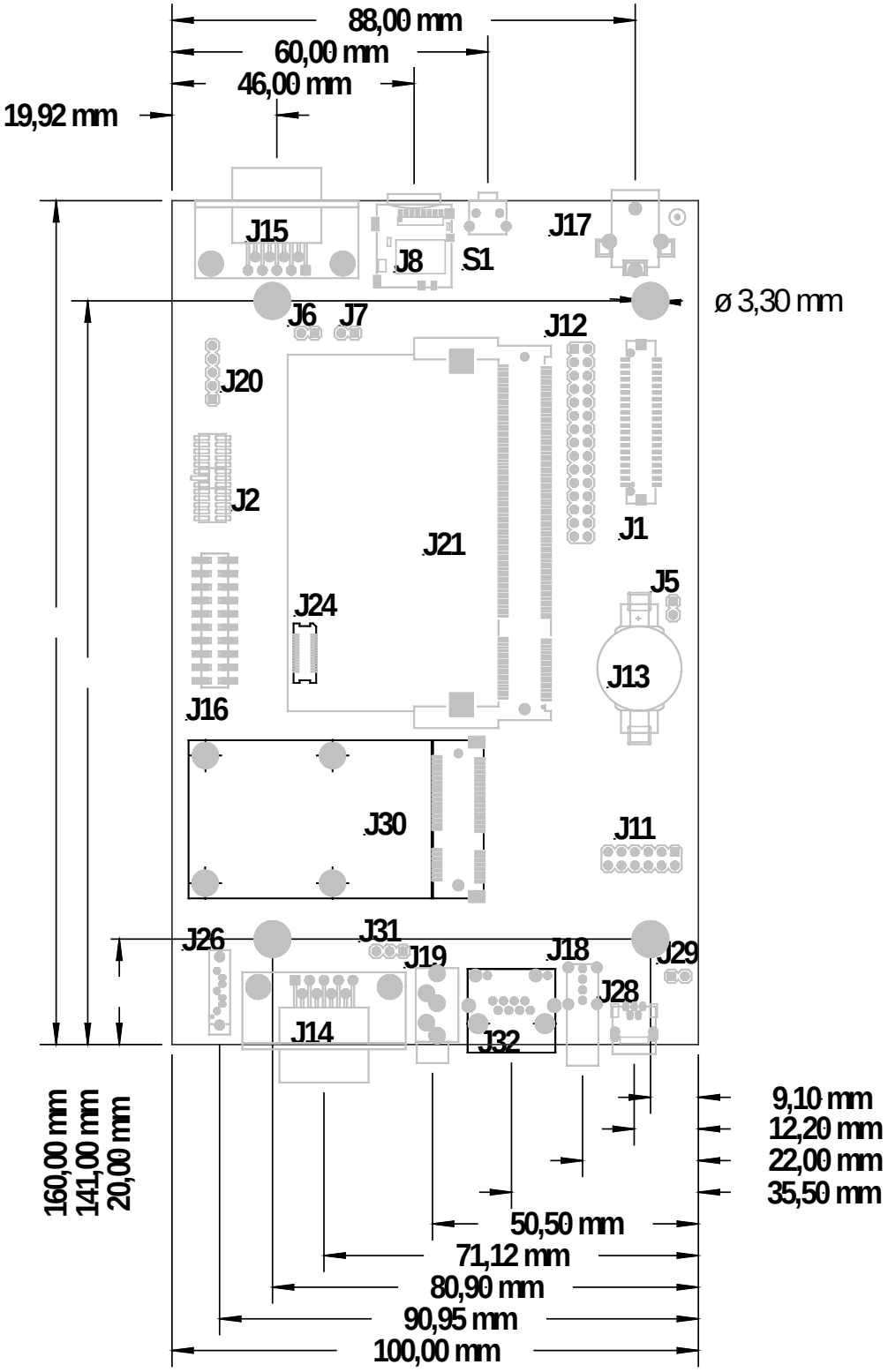
8.2 Environmental Specifications

Operating temperature	
Standard	-25°C ... +85°C
Storage temperature	
Storage temperature	-40 ... +125°C
Relative humidity	
Relative humidity	0 ... 95 %, non-condensing

8.3 Mechanical Specifications

Mechanical Specifications	
Weight	approx. 102 g
Board	glass-epoxy FR-4, UL-listed, 4 layers
Dimensions	160 mm x 100 mm x 18 mm

8.3.1 Dimensional Drawing



The LVDS connector J25 (near J2) and the EDT connector J33 (near J1) are placed on the Bottom side.

9 References

[1] DDR1 & DDR2 SODIMM Socket 0.6 mm Pitch 200 Pos Standard Profile
Standard Type
Tyco Electronics
Part Number: 1473005-1

[2] TLV320AIC23B
Stereo Audio CODEC, 8- to 96-kHz, With Integrated Headphone Amplifier
February 2004
Texas Instruments