» TRACe B304-TR «

User's Manual

SD.DT.G45-0e - February 2015

Revision History

Publication Title:	TRACe B304-TR User's Manual	
Doc. ID:	SD.DT.G45-0e	
Rev.	Brief Description of Changes	Date of Issue
0e	Initial Issue	02-2015

Proprietary Note

This document contains information proprietary to Kontron. It may not be copied or transmitted by any means, disclosed to others, or stored in any retrieval system or media without the prior written consent of Kontron or one of its authorized agents.

The information contained in this document is, to the best of our knowledge, entirely correct. However, Kontron cannot accept liability for any inaccuracies or the consequences thereof, or for any liability arising from the use or application of any circuit, product, or example shown in this document.

Kontron reserves the right to change, modify, or improve this document or the product described herein, as seen fit by Kontron without further notice.

Trademarks

This document may include names, company logos and trademarks, which are registered trademarks and, therefore, proprietary to their respective owners.

Environmental Protection Statement

This product has been manufactured to satisfy environmental protection requirements where possible. Many of the components used (structural parts, printed circuit boards, connectors, batteries, etc.) are capable of being recycled.

Final disposition of this product after its service life must be accomplished in accordance with applicable country, state, or local laws or regulations.

Environmental protection is a high priority with Kontron.

Kontron follows the DEEE/WEEE directive.

You are encouraged to return our products for proper disposal.

The Waste Electrical and Electronic Equipment (WEEE) Directive aims to:

- reduce waste arising from electrical and electronic equipment (EEE)
- make producers of EEE responsible for the environmental impact of their products, especially when they become waste
- encourage separate collection and subsequent treatment, reuse, recovery, recycling and sound environmental disposal of EEE
- improve the environmental performance of all those involved during the lifecycle of EEE

Conventions

Note: this notice calls attention to important features or instructions.

Caution: this notice alert you to system damage, loss of data, or risk of personal injury.

ESD: This banner indicates an Electrostatic Sensitive Device.

This symbol indicates that product must be connected to earth ground prior making any other connections to the equipment.

This symbol Indicates on the rating plate that the equipment is suitable for direct current only (24 VDC-110 VDC nominal). Identify relevant terminals

The CE marking certifies that the product complies with the essential requirements of the Directive:

- 2011/65/EC of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment
- 2006/95/CE of the European Parliament and of the Council of 12 December 2006 on the harmonisation of the laws of Member States relating to electrical equipment designed for use within certain voltage limits.
- 2004/108/CE of the European Parliament and of the Council of 15 December 2004 on the approximation of the laws of the Member States relating to electromagnetic compatibility

All numbers are expressed in decimal, except addresses and memory or register data, which are expressed in hexadecimal. The prefix '0x' shows a hexadecimal number, following the 'C' programming language convention.

The multipliers 'k', 'M' and 'G' have their conventional scientific and engineering meanings of $*10^3$, $*10^6$ and $*10^9$ respectively. The only exception to this is in the description of the size of memory areas, when 'K', 'M' and 'G' mean $*2^{10}$, $*2^{20}$ and $*2^{30}$ respectively.

When describing transfer rates, 'k' 'M' and 'G' mean $*10^3$, $*10^6$ and $*10^9$ *not* $*2^{10}$ $*2^{20}$ *and* $*2^{30}$.

In PowerPC terminology, multiple bit fields are numbered from 0 to n, where 0 is the MSB and n is the LSB. PCI and CompactPCI terminology follows the more familiar convention that bit 0 is the LSB and n is the MSB.

Signal names ending with an asterisk (*) or a hash (#) denote active low signals; all other signals are active high.

Signal names follow the PICMG 2.0 R3.0 CompactPCI Specification and the PCI Local Bus 2.3 Specification.

For Your Safety

Your new Kontron product was developed and tested carefully to provide all features necessary to ensure its compliance with electrical safety requirements. It was also designed for a long fault-free life. However, the life expectancy of your product can be drastically reduced by improper treatment during unpacking and installation. Therefore, in the interest of your own safety and of the correct operation of your new Kontron product, you are requested to conform with the following guidelines.

High Voltage Safety Instructions

As a precaution, in case of danger, the power connector is the product's main disconnect device and must be easily accessible.

Warning!
All operations on this device must be carried out by sufficiently skilled personnel only.

Caution, Electric Shock!
Before installing a not hot-swappable Kontron product into a system always ensure that your mains power is switched off. This applies also to the installation of piggybacks. Serious electrical shock hazards can exist during all installation, repair and maintenance operations with this product. Therefore, always unplug the power cable and any other cables which provide external voltages before performing work.
Earth ground connection to vehicle's chassis or a central grounding point shall remain connected. The earth ground cable shall be the last disconnected or the first connected during operations of cabling.

Special Handling and Unpacking Instructions

ESD Sensitive Device!
Electronic boards and their components are sensitive to static electricity. Therefore, care must be taken during all handling operations and inspections of this product, in order to ensure product integrity at all times

Do not handle this product out of its protective enclosure while it is not used for operational purposes unless it is otherwise protected.

Whenever possible, unpack or pack this product only at EOS/ESD safe work stations. Where a safe work station is not guaranteed, it is important for the user to be electrically discharged before touching the product with his/her hands or tools. This is most easily done by touching a metal part of your system housing.

It is particularly important to observe standard anti-static precautions when changing piggybacks, ROM devices, jumper settings etc. If the product contains batteries for RTC or memory backup, ensure that the board is not placed on conductive surfaces, including anti-static plastics or sponges. They can cause short circuits and damage the batteries or conductive circuits on the board.

General Instructions on Usage

In order to maintain Kontron's product warranty, this product must not be altered or modified in any way. Changes or modifications to the device, which are not explicitly approved by Kontron and described in this manual or received from Kontron's Technical Support as a special handling instruction, will void your warranty.

This device should only be installed in or connected to systems that fulfill all necessary technical and specific environmental requirements. This applies also to the operational temperature range of the specific system version, which must not be exceeded.

In performing all necessary installation and application operations, please follow only the instructions supplied by the present manual.

Keep all the original packaging material for future storage or warranty shipments. If it is necessary to store or ship the product, please re-pack it as nearly as possible in the manner in which it was delivered.

Special care is necessary when handling or unpacking the product. Please consult the special handling and unpacking instruction.

Table Of Contents

List Of Figures

List Of Tables

Chapter 1 - Introduction

Kontron TRACe B304-TR is an EN50155 certified fanless Operational Computer designed to ensure stable operation in harsh environments. This "**B**" version is specifically designed to ease customization thanks to MiniPCie slots and multiple configuration extentions to help integrators meet application-specific requirements. The B304-TR version is based on a CoM express© CPU module featuring Intel® Atom E3845 Bay Trail (quad core @ 1.91 GHz).

Kontron COMe Intel® Atom E3845 Bay Trail CPU: http://www.kontron.com/products/computeronmodules/com-express/com-express-mini/come-mbt10/specification

Figure 1: TRACe B304-TR Overview

1.1 Manual Overview

1.1.1 Objective

This guide provides general information, hardware instructions, operating instructions and functional description of the TRACe B304-TR system. The onboard programming, onboard firmware and other software (e.g. drivers and BSPs) are described in detail in separate guides (see section A.1 "Associated Documentation").

This hardware technical documentation reflects the most recent version of the product. Functional changes that differ from previous version of the document are identified by a vertical bar in the margin.

1.1.2 Audience

This manual is written to cover, as far as possible the range of people who will handle or use the TRACe B304-TR system, from unpackers/inspectors, through system managers and installation technicians to hardware and software engineers. Most chapters assume a certain amount of knowledge on the subjects of single board computer architecture, interfaces, peripherals, system, cabling, grounding and communications.

1.1.3 Scope

This manual describes all variants of the TRACe B304-TR series.

1.1.4 Structure

This manual is structured in a way that will reflect the sequence of operations from receipt of the system up to getting it working. Each topic is covered in a separate chapter and each chapter begins with brief introduction that tells you what the chapter contains. In this way, you can skip any chapters that are not applicable or with which you are already familiar.

The chapters are:

- Chapter 1 - Introduction (this chapter)
- Chapter 2 - Getting Started with TRACe
- Chapter 3 - Deploying TRACe
- Chapter 4 - Updating TRACe
- Chapter 5 - Getting Help
- Chapter 6 - Customizing TRACe B304-TR
- Chapter 7 - Reference Information
- Appendix A - References
- Appendix B - List of Abbreviations

1.2 TRACe B304-TR Overview

1.2.1 Main Features

Kontron TRACe B304-TR is an EN50155 certified fanless operational computer. This "B" version is specifically designed to ease customization thanks to MiniPCie slots and multiple configuration extensions to help integrators meet application-specific requirements. The B304-TR version is based on a COM Express© CPU module featuring intel® Atom E3845 Bay Trail (quad core @ 1.91 GHz). The TRACe B304-TR is designed to ensure stable operation in harsh environments.

The Kontron TRACe B304-TR features a wide range power supply (from 24 VDC to 110 VDC). Its front plate is dedicated to the operational connectors (certified I/O according to EN50155 standard: Ethernet, serial ports, audio, digital inputs and outputs) whereas the rear plate hosts maintenance connectors (DisplayPort, USB, serial, Ethernet). On this plate, a reserved area with 3 pre-holes allows the routing of non-provided Mini PCi-express cards I/O signals (GSM/GPRS/3G/LTE/4G, GPS, WiFi, Bluetooth).

Kontron TRACe B304-TR extensible and modular design allows custom configuration. on operational front plate, an option plate is available for additional interfaces (MVB, CAN Layer2, CAN Open, Profibus…). TRACe B304-TR has been designed to support a comprehensive health management capability, thanks to sensors and a microcontroller for system health monitoring. The integrated Hearth Management Unit (HMU) monitors boards and inbox ambient temperature, voltages, current and even manages Vital Product Data (P/N, S/N, E.C. Level,…) of main components.

Health Management by Kontron covers all the vital resources of TRACe B304-TR to report, log, and transmit any out of specs parameters and/ or any failures at power-on and during operations of TRACe B304-TR.

1.2.2 Ordering Information

» Available Order Codes

Order Code	Description
TRACe B304-TR	EN50155 certified fanless Operational Computer / Intel® Atom E3845 Bay Trail (quad core @ 1.91 GHz) COMe CPU, / 2 GB DDR3 with ECC, 8 GB SLC Flash, 3 mPCIe slots / Wide range Railway certified PSU 24 VDC-110 VDC / EN50155 Class TX (-40° to 70° C / 10 min @ 85°C),IP50
TRACE-KIT-CAB-EVAL	Set of Cables for TRACe B304-TR evaluation, consisting of: 1x CABLE ASSY: Power (M12-A coded to free end), 1x ETHERNET (M12-X coded to RJ45), 1x Serial (RJ-12 to dual DB9)
TRACE-KITSATA-1	Set of SATA cables to install one 2,5" SSD on TRACe B304-TR, consisting of: 1xSATA Power cable, 1x SATA Data cable, 4x screws and spacers
TRACE-STARTER-KIT	
TRACE-COVMNT-V01	Cover Plate for Maintenance Side (Dust Protection)

Table 1: TRACe Order Codes

1.2.3 Introducing Operational and Maintenance Side Views

Operational Side View

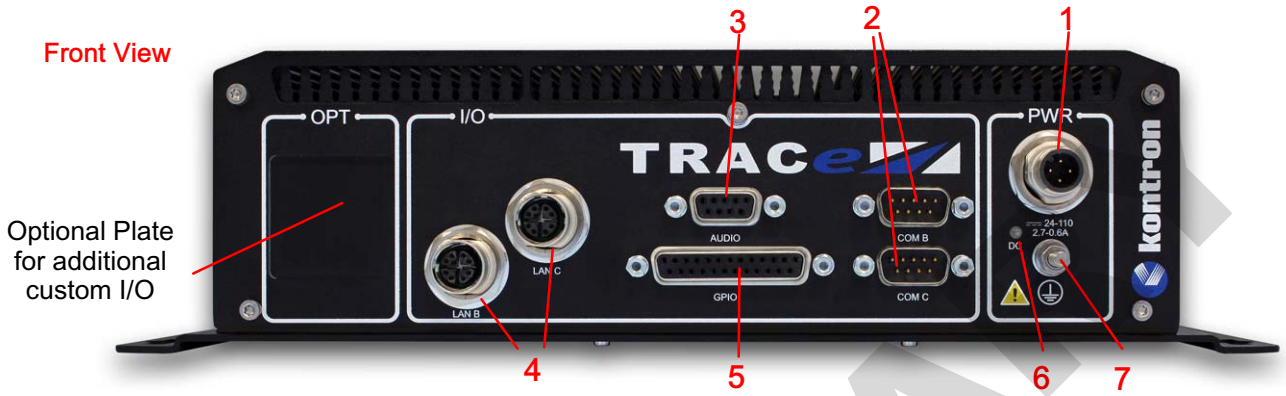


Figure 2: TRACe B304-TR Front View

1 Wide Range 24V-110V DC Power Supply input
2 Serial lines RS232/RS422/RS485
3 Audio: Stereo Line In, Stereo Line Out
4 Gigabit Ethernet ports
5 GPIO: 4x inputs, 4x outputs
6 Power status LED
7 Mechanical Ground

Maintenance Side View

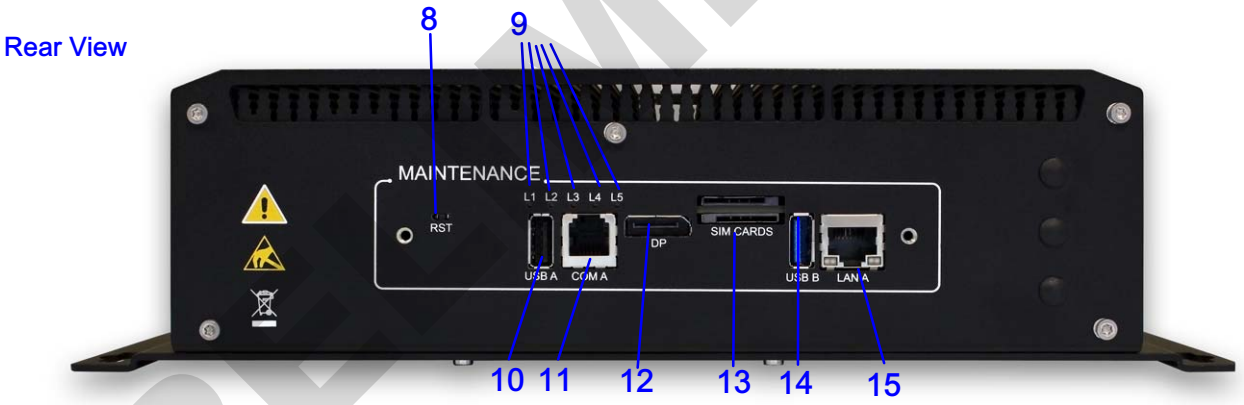


Figure 3: TRACe B304-TR Rear View

8 Reset Button
9 Status and User LEDs: L1 ... L5
10 USB 2.0
11 Processor first serial line and HMU serial line (RJ-12)
12 DisplayPort
13 2x SIM Card Sockets
14 1x USB 3.0 / USB2 port [BIOS configurable]
15 Gigabit Ethernet Port

The connector 11 is an RJ-12 connector on which two serial lines are available (processor + HMU). You can get the compatible cable by purchasing our Cable Kit: TRACE-KIT-CAB-EVAL
You can plug an RJ-11 cable in this RJ-12 connector to get the processor serial line (TX,RX,GND).
If you use an RJ-12 cable, make sure your cabling does not handle the pins allocated to the HMU serial line as flow control signals for the processor serial line to prevent conflitcts with the HMU.
If the HMU serial line is not needed and a custom RJ-12 cable is used, it is recommended to leave the HMU serial line pins unconnected.

1.2.4 Block Diagram

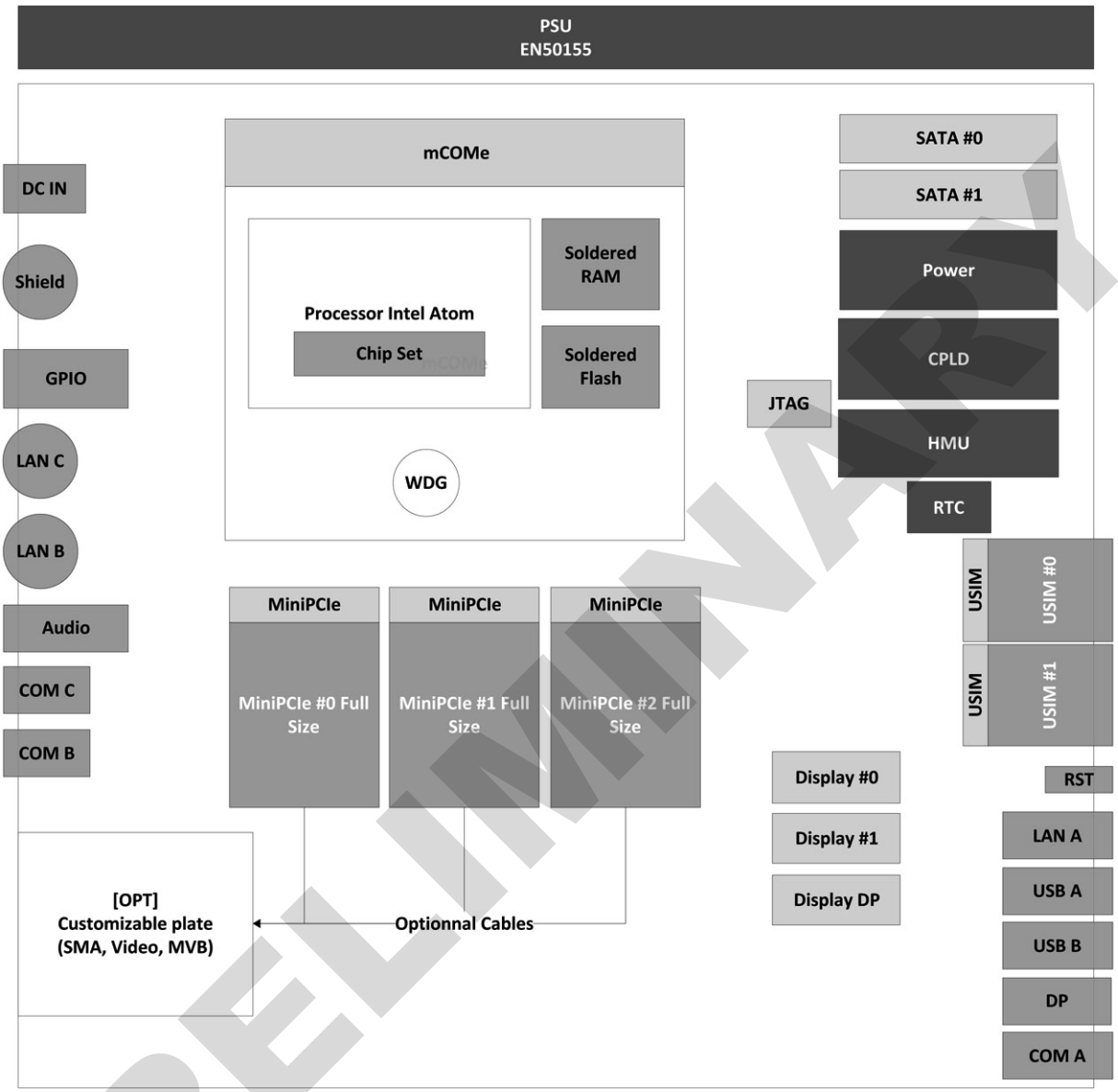


Figure 4: TRACe B304-TR Block Diagram

1.3 Environmental Specifications

- > ITE Safety Europe
  - EN 60950-1: 2006 +A1: 2010 +A2: 2013 + A11: 2009 +A12: 2011
  - Safety Europe Directive
- > Railway Safety / Supply Voltage
  - EN 50155: 2007
  - Railway
- > Thermal Operating
  - EN 50155
  - NF EN 60068-2-1: 2007
  - NF EN 60068-2-2: 2007
  - Railway Class Tx
- > Climatic Test
  - Damp heat, cyclic
  - EN 50155
  - NF EN 60068-2-30: 2006
  - Railway
- > Random Vibration
  - Operating, Long life testing
  - EN 50155
  - NF EN 61373: 2011-04
  - NF EN 60068-2-64: 2008
  - Railway Class 1B
- > Shock
  - EN 50155
  - NF EN 61373: 2011-04
  - NF EN 60068-2-27: 2009.
  - Railway Class 1B

*

- > EMC Emission
  - EN 50155
  - NF EN50121-3-2
  - EN 55011
- > EMC Immunity
  - EN 50155
  - NF EN50121-3-2
  - EN 61000-4-2
  - EN 61000-4-3
  - EN 61000-4-4
  - EN 61000-4-5
  - EN 61000-4-6
  - Railway
- > WEEE Directive 2002/96/EC Waste electrical and electronic equipment
- > RoHS Directive 2002/95/EC Restriction of the use of certain hazardous substances in electrical and electronic equipment
- > Environmental Protection:
  - IP50 (NF EN 60529: 2000)(*)

(*) IP50 for Maintenance side: only with optional Cover Plate P/N TRACE-COVMNT-V01

Chapter 2 - Getting Started with TRACe B304-TR

2.1 Receipt of the Equipment

2.1.1 Checking the Packages

Inspecting the packing cartons and verifying their condition is the responsability of the customer and should be carried out upon delivery.

> Inspect the packing and check its condition:
  - no broken corners,
  - general state of the case (no rips or holes),
  - condition of the bands and the clips.
> If you wish to report any damage in transit, you should make out a full report, and also note the damage on the packing list that accompanies the equipment. Ensure that the report and the packing list are signed by yourself and also by the transport agent, and send a copy of these documents to:
  - the transport company,
  - Kontron.

2.1.2 Unpacking

Unpacking the equipment must be carried out under the supervision of an authorized technician.

> Open the package and take out the items one by one.
> Inspect each item and make a note of any possible defects (scratches, marks or blemishes, damaged cables, etc.). If necessary, make a report of any damage or defects.
> Check the equipment against the packing list and report any missing items.

It is recommended that you keep the package and the anti-shock protection. This will be required if you decide to move your system to a different site.

2.2 System Identification

An identification label is available on the left side of the system.

Label data:

- Model : TRACE-B304-TR
- S/N : XXXX (4 digits chronologic Serial Number)
- ECL : 10000 (5 digits Engineering Change Level)

Figure 5: Identification Label Location

2.3 At a Glance

Processor

> Intel® Atom™ Bay Trail-I Platform E3845 quad cores @ 1.91 GHz

Memory

> 2 GB DDR3 with ECC

Storage

> EMMC 8 GB SLC Flash soldered

Connectivity

> Operational side :
- 2x M12 GbE (10/100/1000BASE-T)
- 2 x Serial SUBD9 for RS232/422/485
- 1x Audio SUBD9
- 1x GPIO SUBD25

> Maintenance side:
- 1x USB (high speed)
- 1x USB 3.0 (3.0 only) port [BIOS configurable]
- 1x RJ-45 GbE (10/100/1000BASE-T)
- 1x RJ-12 RS-232 for processor and HMU

Software

- Linux: Refer to 7.6.1.2 COMe BSP page 59.
- Windows: Refer to 7.7 Windows (BSP) page 65

Specific TRACe tools package and live demo image will be made available on TRACe Kontron Web Site (download section).

Management

- Operational side status LED: Power status LED
- Maintenance side Status an User LEDs:
  - L1: User1
  - L2: User0,
  - L3: Alarm/HMU,
  - L4: Sys/SATA,
  - L5: Power Status

Form Factor

> Dimensions:

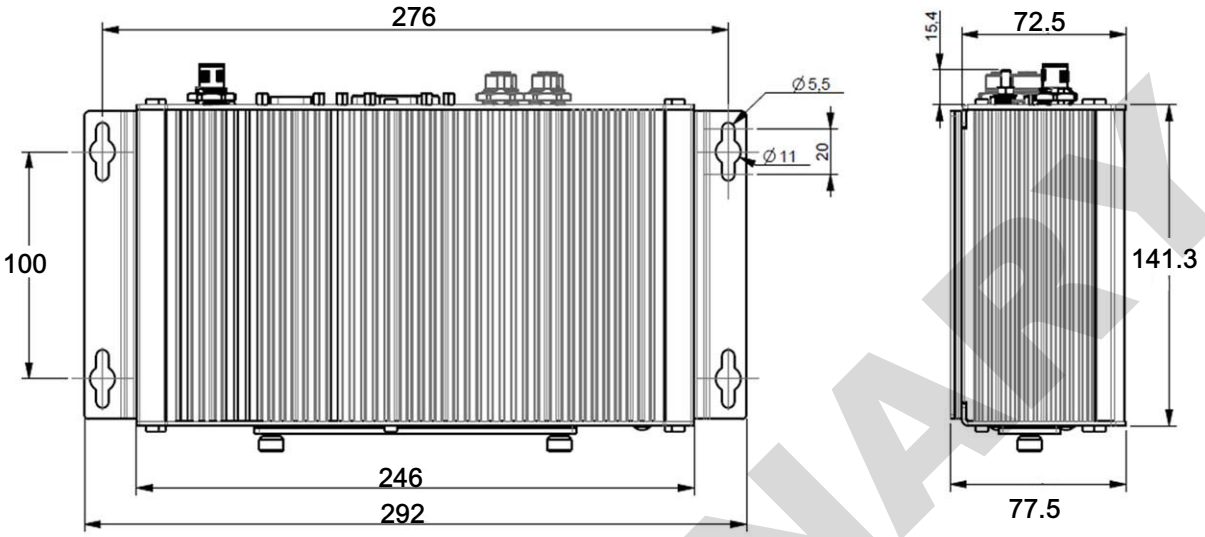


Figure 6: TRACe B304-TR Dimensions

> Weight: 2.5 kgs

Warranty

> 2 years

2.4 Operational Side: I/O Connectors Pinout

2.4.1 DC IN: External PSU M12 Connector, Male, 4 Pin, A coded.

Figure 7: DC IN Connector

Pin Configuration

Pin	Pin Name	Signal Name
1	VIN+	POWER IN + (+VDC)
2	VIN-	POWER IN- (GND)
3	IGN	Ignition (IGN)
4	NC	NC
Chassis	SHLD	Chassis ground (Shield)

Table 2: DC IN Pin Configuration

To power-on the system, you need a power cable with M12 Connector Female 4 Pin A-Coded in one end (see Appendix A “Accessories References Examples” pages 69 to find some references) to fit the DC IN connector.

The power cable is included in TRACE-KIT-CAB-EVAL cable kit to be purchased separately.

According to the above pinout, free ends of this cable must be wired as follows (refer to section 2.6.1 page 22):

- Brown: +VDC
- White: -VDC
- Blue: IGN (+VDC to Power On)

IGN can be directly connected to VDC to have the system always on when VDC is applied, or connected to VDC through a switch to power the system on/off with VDC kept applied.

A power off controlled by the IGN signal has the same impact than removing VDC: all PSUs are switched off including standby power supplies. However using IGN to power on/off is recommended because this enables some extra features such as an automatic system shutdown with a delayed power-off when the IGN signal is disabled, or a system wakeup from sleep by toggling the IGN signal.

Note Even if IGN is expected to be connected to VDC, it can be alternatively connected to another voltage source with same GND(POWER IN-) and a voltage in the same range than the one required for VDC.

VDC and IGN voltage range to GND: 24 VDC-110 VDC nominal (17 VDC min - 138 VDC max).

Current on VDC for VDC = 24 VDC, when idle under BIOS or Linux OS: around 800 mA.

Current on IGN for all IGN voltage range: around 4 mA

2.4.2 LAN B, LAN C: Ethernet M12 Connectors, Female, 8 Pin, X coded.

View from Receptacle Side

Figure 8: LAN B, LAN C Connectors

HMU 10/100 Ethernet interface can be routed to LAN-C (can be selected by the `trace_config` tool)

Pin Configuration

Pin	Pin Name
1	DA+
2	DA-
3	DB+
4	DB-
5	DD+
6	DD-
7	DC-
8	DC+

Table 3: LAN B, LAN C Connectors Pin Configuration

2.4.3 COM B, COM C: Serial SUBD9 Connectors, Male, 9 Pin.

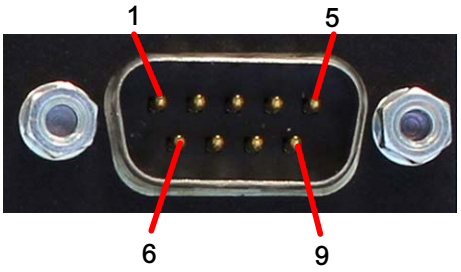


Figure 9: COM B, COM C Connectors

Pin Configuration

Pin	RS-232	RS-422/RS-485 Full Duplex	RS-422/RS-485 Half Duplex
1	N.C.	N.C.	N.C.
2	RX	RX+ (A)	N.C.
3	TX	TX- (Z)	TX-/RX- (Z/B)
4	N.C.	N.C.	N.C.
5	GND	N.C.	N.C.
6	N.C.	N.C.	N.C.
7	RTS	TX+ (Y)	TX+/RX+ (Y/A)
8	CTS	RX- (B)	N.C.
9	N.C.	N.C.	N.C.

Table 4: COM B, COM C Connectors Pin Configuration

Note Two naming conventions are used for RS-422/RS-485 differential signals, they match each other as follows : TX+ = Y, TX- = Z, RX+ = A, RX- = B

The serial mode and duplex can be set using the `trace_config` tool

When in 485 mode, the RTS signal from the UART is no more available on the connectors but is used as a "`TX enable`" (transmit enable): when RTS is high (logic 1 driven by UART), TX is enabled. TX is disabled by switching RTS low (under Linux OS, RTS can be managed by the `TIOCMGET/TIOCMSET IOCTL`, using the `TIOCM_RTS` flag)

COM-B is muxed between UART (default) and HMU (can be selected by the `trace_config` tool).

When in HMU mode, transmit is always enabled (RTS always at 1) so only RS-232 and RS-422 are supported.

See COM-A for HMU serial line routing to COM-A or COM-B

2.4.4 GPIO: SUBD25 Connector, Female, 25 Pin.

Figure 10: GPIO Connector

Pin Configuration

Pin	Signal Name	Pin Name	Signal Name
1	GND_GPIO_ISO	14	GPIO_IN[0]
2	GND_GPIO_ISO	15	GPIO_IN[1]
3	GND_GPIO_ISO	16	GPIO_IN[2]
4	GND_GPIO_ISO	17	GPIO_IN[3]
5	N.C.	18	N.C.
6	N.C.	19	N.C.
7	N.C.	20	N.C.
8	N.C.	21	24 VISO (external)
9	GND_GPIO_ISO	22	GPIO_OUT[0]
10	GND_GPIO_ISO	23	GPIO_OUT[1]
11	GND_GPIO_ISO	24	GPIO_OUT[2]
12	GND_GPIO_ISO	25	GPIO_OUT[3]
13	GND_GPIO_ISO	26, 27	Shield

Table 5: GPIO Connector Pin Configuration

24 VISO DC voltage (8 VDC min - 29 VDC max) must be applied to pin 21 to power the isolated GPIO logic.

GPIO_OUT[n] are open-collector outputs, enabled (driven low to GND_GPIO_ISO) when a logic 1 is written from software. Each output can sink up to 20 mA. Maximum voltage on GPIO_OUT[n] (to GND_GPIO_ISO) is 29 VDC.

GPIO_IN[n] are inputs that are read at 1 from software when at logic level high (24V logic).

Maximum voltage on GPIO_IN[n] (to GND_GPIO_ISO) is 29 VDC.

These inputs have an hysteresis (around 1V); level high is above 17V; level 0 under 16V.

GPIO_OUT[n] and GPIO_IN[n] can have a voltage greater than 24 VISO provided than this voltage does not exceed 29 VDC.

2.4.5 Audio: SUBD9 Connector, Female, 9 Pin.

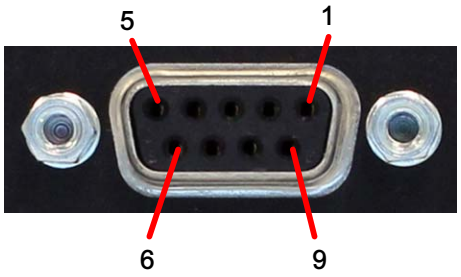


Figure 11: Audio Connector

Pin Configuration

Pin	Signal Name
1	LINE_OUT_L (Headphone)
2	GND_AUDIO
3	LINE_OUT_R (Headphone)
4	GND_AUDIO
5	AUDIO LINE MICBIAS
6	5V (internal)
7	LINE_IN_L (Microphone)
8	GND_AUDIO
9	LINE_IN_R (Microphone)

Table 6: Audio Connector Pin Configuration

2.5 Maintenance Side: I/Os Connector Pinout

2.5.1 COM A: RJ-12 Connector

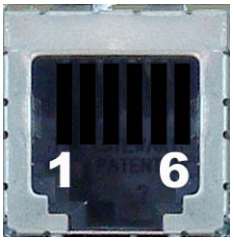


Figure 12: COM A Connector

Pin Configuration

Pin	Signal Name
1	HMU TX
2	GND
3	COMe TX
4	COMe RX
5	GND
6	HMU RX

Table 7: COM A Connector Pin Configuration

HMU serial line on COM-A (default) can be routed to COM-B instead (can be selected by the `trace_config` tool).

COM-B mode	COM-A	COM-B	Comments
UART	TX = HMU TX RX = HMU RX	TX = UART TX RX = UART RX RTS = UART RTS	 RTS is available on COM-B only in RS-232 mode
HMU	TX = HMU TX RX = --	TX = HMU TX RX = HMU RX RTS = 1	TX output of HMU is available on both connectors RTS is available on COM-B only in RS-232 mode

2.5.2 LAN A Gigabit Ethernet Port

The TRACe B304-TR have a Gigabit Ethernet port:

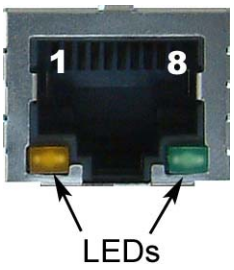


Figure 13: LAN A Gigabit Ethernet Connector

Pin Assignment

PIN	10BASE-T		100BASE-TX		1000BASE-T	
	I/O	SIGNAL	I/O	SIGNAL	I/O	SIGNAL
1	O	TX+	O	TX+	I/O	BI_DA+
2	O	TX-	O	TX-	I/O	BI_DA-
3	I	RX+	I	RX+	I/O	BI_DB+
4	-	-	-		I/O	BI_DC+
5	-	-	-		I/O	BI_DC-
6	I	RX-	I	RX-	I/O	BI_DB-
7	-	-	-		I/O	BI_DD+
8	-	-	-		I/O	BI_DD-
Shell	Chassis Ground					

Table 8: Gigabit Ethernet Connector Pin Assignment

Note The Ethernet transmission should operate using a CAT5 cable with a maximum length of 100 m.

The Ethernet connectors are available as RJ-45 connectors with tab down.

2.5.3 USB B: USB 3.0 Connector

The TRACe B304-TR have a USB3.0 compliant connector. It can work as a USB 2.0 connector or as a USB 3.0 connector.

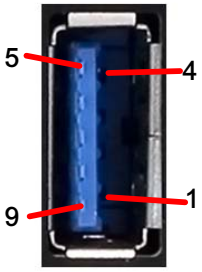


Figure 14: USB 3.0 Connector

Pin Assignment:

PIN	SIGNAL	DESCRIPTION	I/O
1	+5V protected	USB power	-
2	DATA-	Differential USB-	I/O
3	DATA+	Differential USB+	I/O
4	GND	Ground	-
5	USBSS_RX-	Differential USB Receive -	I
6	USBSS_RX+	Differential USB Receive +	I
7	GND	Ground	-
8	USBSS_TX	Differential USB Transmit -	O
9	USBSS_TX+	Differential USB Transmit +	O

Table 9: USB 3.0 Connector Pin Assignment

2.5.4 USB A: USB 2.0 Connector

The TRACe B304-TR have a USB 2.0 connector type A right angle

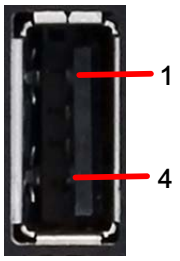


Figure 15: USB 2.0 Connector

Pin Assignment

PIN	SIGNAL	FUNCTION	I/O
1	VCC (+5V Protected)	VCC	--
2	USB_D-	Differential USB-	I/O
3	USB_D+	Differential USB+	I/O
4	GND	GND	--

Table 10: USB 2.0 Connector Pin Assignment

All the signal lines are EMI-filtered.

2.5.5 SIM CARDS: SIM Connectors

The TRACe B304-TR have two SIM connectors

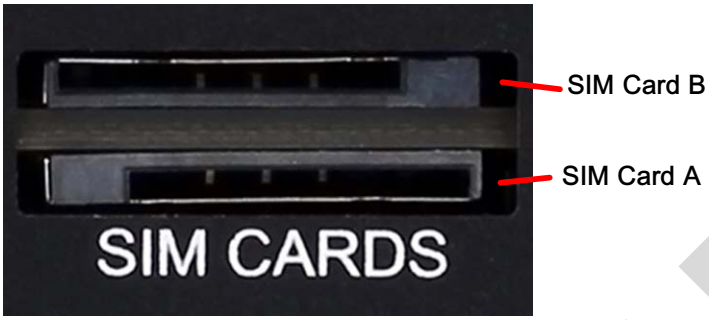


Figure 16: SIM Connector

Pin Assignment

PIN	NAME	SIGNAL DESCRIPTION
1	VCC	VCC
2	Reset	RST
3	Clock	CLK
4	SW1	SIM Detection
5	GND	GND
6	VPP	Not Connected
7	DATA	DATA
8	SW2	GND

Table 11: SIM Connector Pin Assignment

2.5.6 DP: DisplayPort Connector

The TRACe B304-TR have a DisplayPort Interface

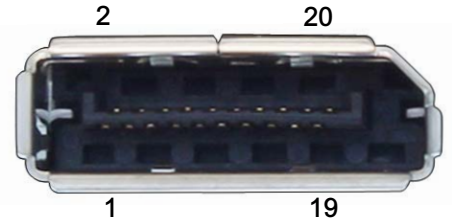


Figure 17: DisplayPort Connector

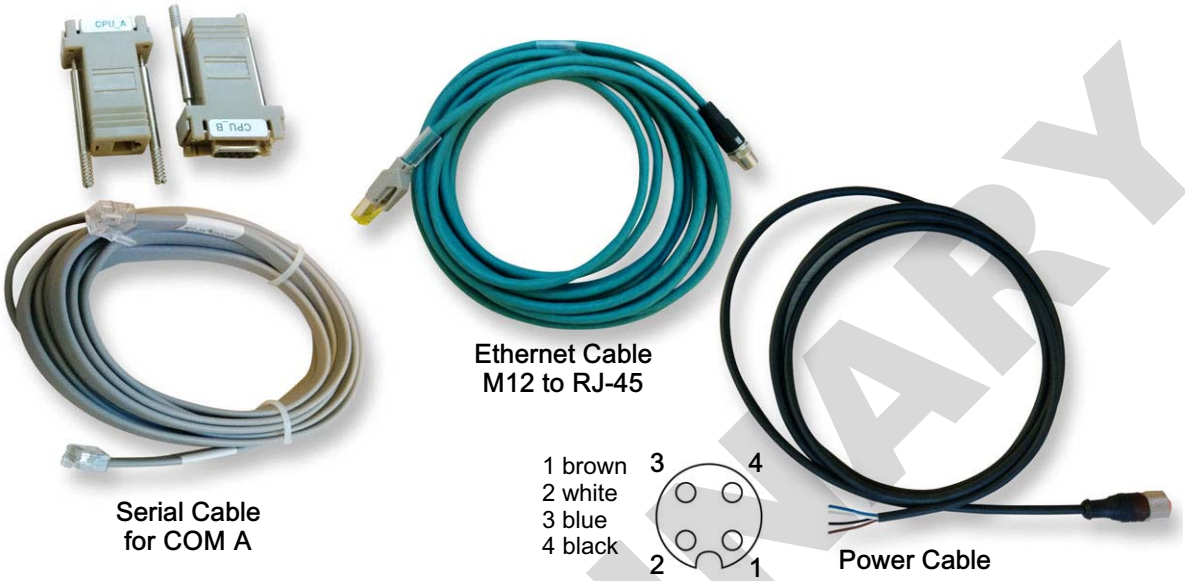
Pin Assignment

PIN	SIGNAL	FUNCTION
1	ML_Lane 0 (p)	Lane 0 (positive)
2	GND	Ground
3	ML_Lane 0 (n)	Lane 0 (negative)
4	ML_Lane 1 (p)	Lane 1 (positive)
5	GND	Ground
6	ML_Lane 1 (n)	Lane 1 (negative)
7	ML_Lane 2 (p)	Lane 2 (positive)
8	GND	Ground
9	ML_Lane 2 (n)	Lane 2 (negative)
10	ML_Lane 3 (p)	Lane 3 (positive)
11	GND	Ground
12	ML_Lane 3 (n)	Lane 3 (negative)
13	GND	Ground
14	GND	Ground
15	AUX CH (p)	Auxiliary Channel (positive)
16	GND	Ground
17	AUX CH (n)	Auxiliary Channel (negative)
18	Hot Plug	Hot Plug Detect
19	Return	Return for power
20	DP_PWR	Power for connector

Table 12: DisplayPort Connector Pin Assignment

2.6 Optional Cables Kits

2.6.1 TRACE-KIT-CAB-EVAL



2.6.2 TRACE-KITSATA-1

2.7 Plug and Play with TRACe B304-TR

The following sections are only valid for Linux with TRACe BSP. A live Fedora 20 demo image will be available on the Kontron Web Site under TRACe B304-TR download section.

2.7.1 Plug

Earth ground connection to vehicle's chassis or a central grounding point shall remain connected. The earth ground cable shall be the last disconnected or the first connected during operations of cabling.

To power-on the TRACe B304-TR Operational Box Computer, you need to attach a Power Supply Cable (refer to section 2.6 page 22) to the DC IN connector (PSU wide range 24 VDC-110 VDC). On the other side, it has to be cabled to a DC power source (24 VDC minimum) following the pin-out description in the above section 2.4 "I/O Connectors Pintout" page 11.

Two methods:

1. Graphical session (recommended):
   - Connect a display for graphical session (display and cables not provided) to the DisplayPort on Maintenance side.
   - Plug a USB hub for keyboard and mouse in USB A connector on Maintenance side.
2. Serial console:
   - Connect to the TRACe B304-TR via RJ-12 serial connector on maintenance side using a cable KIT-2X-RJ12DB9 (included in TRACE-KIT-CAB-EVAL) and use a serial terminal emulator as putty or minicom for example.

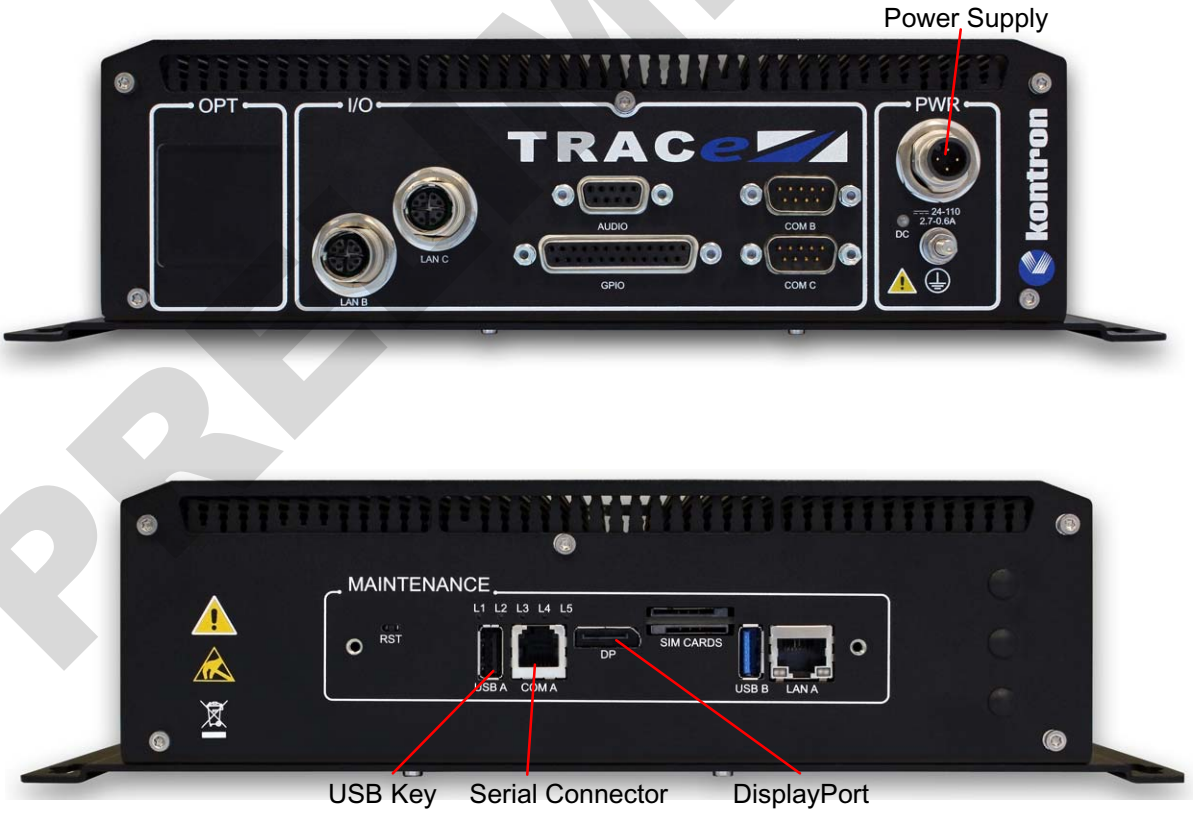


Figure 18: Connecting TRACe B304-TR

To start the system

> Power on the DC power supply module via DC IN connector (section 2.4 “I/O Connectors Pintout” page 11) and then turn on the ignition key. As long as the ignition signal is not connected to the +POWER IN (power supply connector pin 1) the system cannot start (refer to Figure 9 - Ignition Implementation page 13).

> A Linux login prompt should appear in a few seconds

The system can also be configured to stay off when ignition signal is switched on, and start on assertion of GPIO_IN[0] or GPIO_IN[1] (configurable using `trace_config`) or on HMU request

In this case, when waiting to start, the Power status LED is flashing twice every 2 seconds.

To stop the system

> **Manual method :**

Shutdown the OS: with shutdown menu in graphical session, or «halt» command in a Linux terminal for example.

When the Power status LED is flashing once every 2 seconds (shutdown completed), switch off the ignition signal.

You can also optionally remove power on “POWER IN”

> **Automatic method (default):**

This requires the `trace-poweroffd` daemon to be started when the OS is booting in a Linux console.

Just switch off the ignition signal: this automatically performs a shutdown, and once the shutdown is completed, a power-off

Suspend the system

Suspend the OS: with `suspend` menu in graphical session, or "`systemctl suspend`" in a Linux terminal (as root).

The Power status LED is flashing once every 2 second.

To resume, the following methods are supported :

- Switch the ignition signal off and on fastly (less than 750mS).
- Send a Wake-On-Lan Ethernet packet to the system on LAN-B or LAN-C interfaces
- Assertion of a GPIO_IN[0] or GPIO_IN[1] (configurable using trace_config)
- Reset switch on maintenance side
- HMU request

2.7.2 Play

> Plug the system as described in section 2.7.1 “Plug” page 23.
> Power on the system in graphical session mode (monitor and keyboard).
> A Linux (Fedora 20) login prompt should appear in a few seconds.
> Choose one of the three following user’s accounts to log in:
- **Root Account (Administrator)**
  - login: **root**
  - password: **kontron**
- **Tech Account (Super User):**
  - login: **tech**
  - password: **kontron**
- **Guest Account (Guest User):**
  - login: **guest**
  - password: **guest**

» TRACe configuration :

Some configuration settings are available under BIOS setup, however TRACe specific settings are managed by the OS tool `trace_config`

By default, this tool works on saved settings that are applied at power-on (ignition signal on).

It is also possible to work on the current settings, to temporarily change some settings (changes are lost at power-off).

This command must be run as root user.

To display saved settings:

```
[root@trace-board ~]# trace_config
Saved configuration :
  --serial     232      : RS232 mode on COM-B/COM-C serial lines
  --serial     full     : Full duplex on COM-B/COM-C serial lines
  --tpm        on       : Second TPM chip ON
  --poweron    start    : Start when ignition key is switched ON
  --dport      maint    : DisplayPort on maintenance plate connector
  --sata       mini1    : SATA interface to mini socket #1
  --sim        0a1b     : mini socket #0 to SIM-A + socket #1 to SIM-B
  --gpi1wake   off      : Wakeup from GPI1 NOT enabled
  --gpi0wake   off      : Wakeup from GPI0 NOT enabled
  --lanc       i210     : LAN-C connector for Intel i210 ethernet
  --comb       uart     : COM-B connector for PCIe UART
[root@trace-board ~]#
```

To display current settings:

```
[root@trace-board ~]# trace_config -c
Current configuration :
  --serial     232      : RS232 mode on COM-B/COM-C serial lines
  --serial     full     : Full duplex on COM-B/COM-C serial lines
  --tpm        on       : Second TPM chip ON
  --poweron    start    : Start when ignition key is switched ON
  --dport      maint    : DisplayPort on maintenance plate connector
  --sata       mini1    : SATA interface to mini socket #1
  --sim        0a1b     : mini socket #0 to SIM-A + socket #1 to SIM-B
  --gpi1wake   off      : Wakeup from GPI1 NOT enabled
  --gpi0wake   off      : Wakeup from GPI0 NOT enabled
  --lanc       i210     : LAN-C connector for Intel i210 ethernet
  --comb       uart     : COM-B connector for PCIe UART
  --offdelay   3        : Power off delay in units of 1/4 seconds (0 to 255)
  --mini0      absent   : Mini socket #0 PCIe device NOT present
  --mini1      absent   : Mini socket #1 device NOT present (mPCIe or mSATA)
  --mini1sata  absent   : Mini socket #1 SATA device NOT present
  --mini2      absent   : Mini socket #2 PCIe device NOT present
  --mode       normal   : System running in normal mode
  --ledsysr    off      : LED SYS red OFF
  --ledalarmr  off      : LED ALARM red OFF
  --ledusr1    off      : LED USER1 is OFF
  --ledusr0    off      : LED USER0 is OFF
  --sysstate   0        : Current system state code (0 to 15, updated by soft)
  --cpldrev    0x04     : cPLD revision/version on carrier board
[root@trace-board ~]#
```

The help gives the list of all possibles settings and their supported values:

```
[root@trace-board ~]# trace_config -h
```

To also see debug settings:

```
[root@trace-board ~]# trace_config -d -h
```

Some of them are read-only or/and only apply to the current or saved settings.

See chapter 7 - “Reference Information” page 50 for full command output.

> EXAMPLES :

- Switch LED L2 (User0) to red right now:

```
[root@trace-board ~]# trace_config -c --ledusr0 red
```

- Get current LED L2 (User0) state:

```
[root@trace-board ~]# trace_config -c --ledusr0
Current :
  --ledusr0    red      : LED USER0 is RED
[root@trace-board ~]#
```

- Set serial lines to 422/485 at next power-on (saved setting):

```
[root@trace-board ~]# trace_config --serial 485
```

- Set serial lines to 422/485 right now (current setting):

```
[root@trace-board ~]# trace_config -c --serial 485
```

- Get serial lines configuration for both saved and current settings:

```
[root@trace-board ~]# trace_config -c -s --serial
Saved :
  --serial     485      : RS422/485 mode on COM-B/COM-C serial lines
  --serial     full     : Full duplex on COM-B/COM-C serial lines
Current :
  --serial     485      : RS422/485 mode on COM-B/COM-C serial lines
  --serial     full     : Full duplex on COM-B/COM-C serial lines
[root@trace-board ~]#
```

2.8 Device Management

2.8.1 Power status LED

Figure 19: Power On LED

	State	Meaning
POWER	OFF	System power off (Ignition key OFF or forced to OFF by REG_POWER)
	GREEN	System running
	GREEN PULSE ONCE every 2 seconds	System in standby mode (S3,S4 or S5 state)
	GREEN PULSE TWICE every 2 seconds	System waiting for power-on event (GPI, uC command, ...)
	SLOW BLINKING GREEN with period 1 second	System about to power-off (power off delay)
	FAST BLINKING GREEN with period 0.5 second	In debug mode
	ORANGE (red+green)	System reset from COME (CB_RESET# asserted)
	RED	Power error Power supplies are switched off and an error code is reported on USER0/1 LEDs

2.8.2 Status and User LEDs

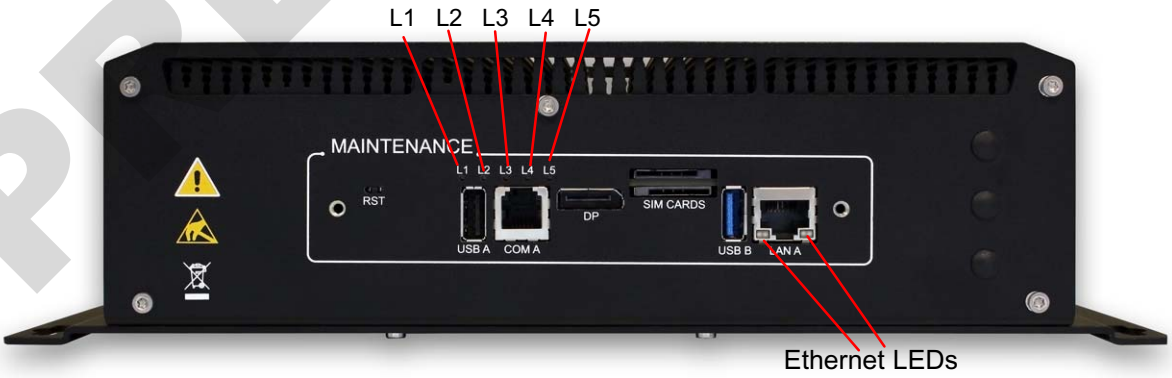


Figure 20: Status LEDs

> Five Status User LEDs: L1 (User1), L2 (User0), L3 (Alarm/HMU), L4 (Sys/SATA), L5 (Power)

These LEDs are bicolor (red and green), giving 4 possible states (off, red, green, orange)

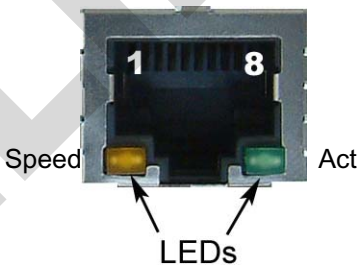
- L1 and L2 are controlled by the cPLD
- L3 and L4 are controlled by the cPLD for red color (Alarm, Sys) but not for green color (HMU, SATA)
- L5 (Power) has the same state than the Power status LED on operational side.

To control the LEDs through the cPLD, the `trace_config` tool can be used (`trace_config -c --ledXXXX YYYY`)

When L5 (Power) is red (power error), an error code is reported on L1 (User1) and L2 (User0) as follows:

Error number	Error name	L1 (User1)	L2 (User0)
0	ERR_NO_ERROR	N/A	N/A
1	ERR_STDBY_5V_3V3	OFF	GREEN
2	ERR_SUS_S3	OFF	RED
3	ERR_3V3_5V	OFF	ORANGE
4	ERR_12V	GREEN	OFF
5	ERR_2V5	GREEN	GREEN
6	ERR_1V0	GREEN	RED
7	ERR_1V5	GREEN	ORANGE
8	ERR_UART	RED	OFF
9	ERR_PCIESW_LOCK	RED	GREEN
10	ERR_SUS_STAT	RED	RED
11	ERR_EMERGENCY_OFF	RED	ORANGE

> Ethernet status LEDs



STATUS		SPEED LED yellow	ACT LED green
Ethernet link is not established		OFF	OFF
10/100 Mbps	Ethernet link establisehd	OFF	ON
	Ethernet Link Activity	OFF	BLINK
1000 Mbps	Ethernet link establisehd	ON	ON
	Ethernet Link Activity	ON	BLINK

Table 13: Ethernet LEDs Status Definition

2.8.3 Computer Reset

> RST button on Maintenance rear side

Figure 21: Computer Reset

2.9 Health Management Unit Use Cases

2.9.1 TRACe as a Box PC

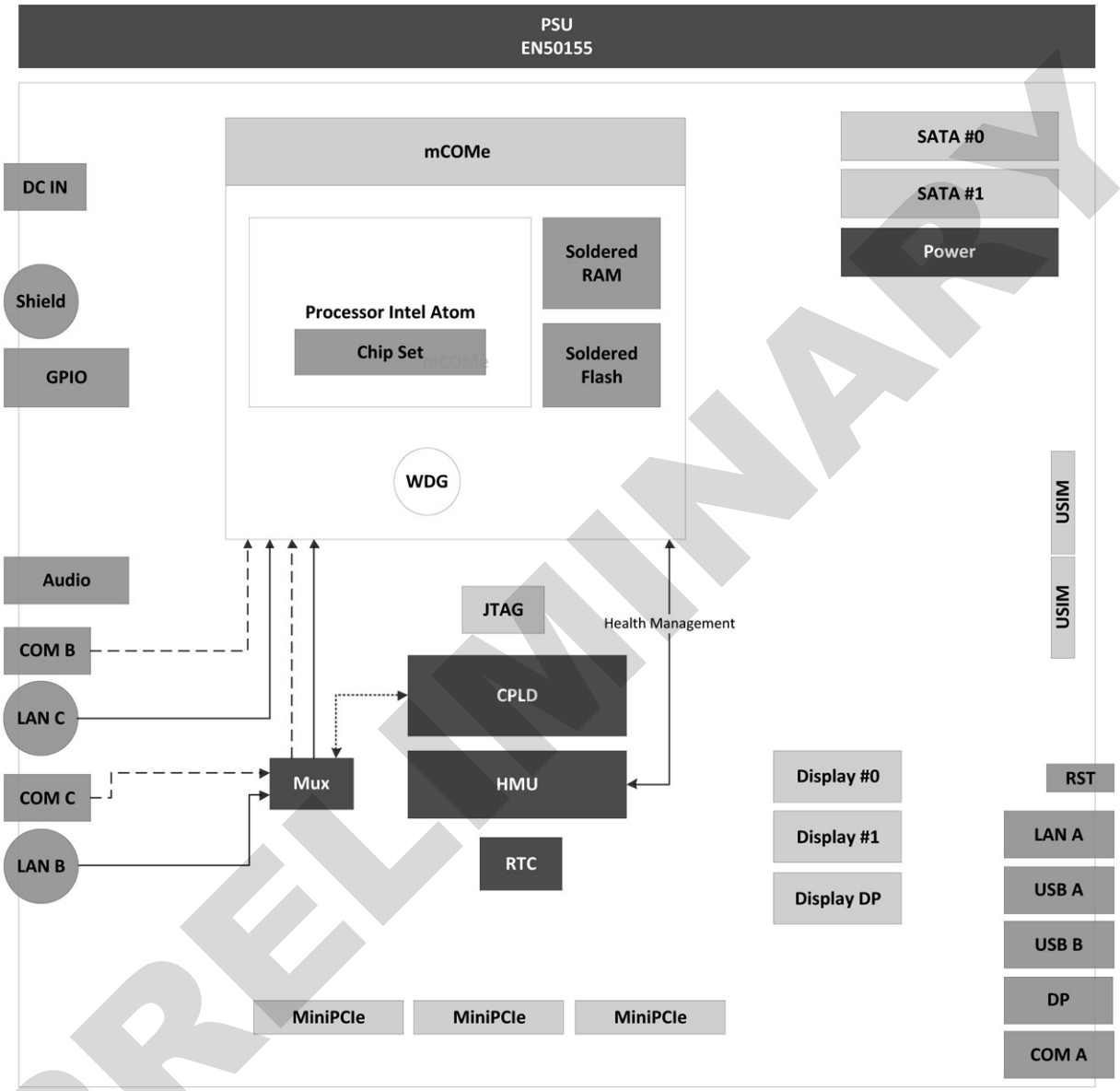


Figure 22: TRACe as a Box PC

2.9.2 TRACe as a monitored Operational Computer

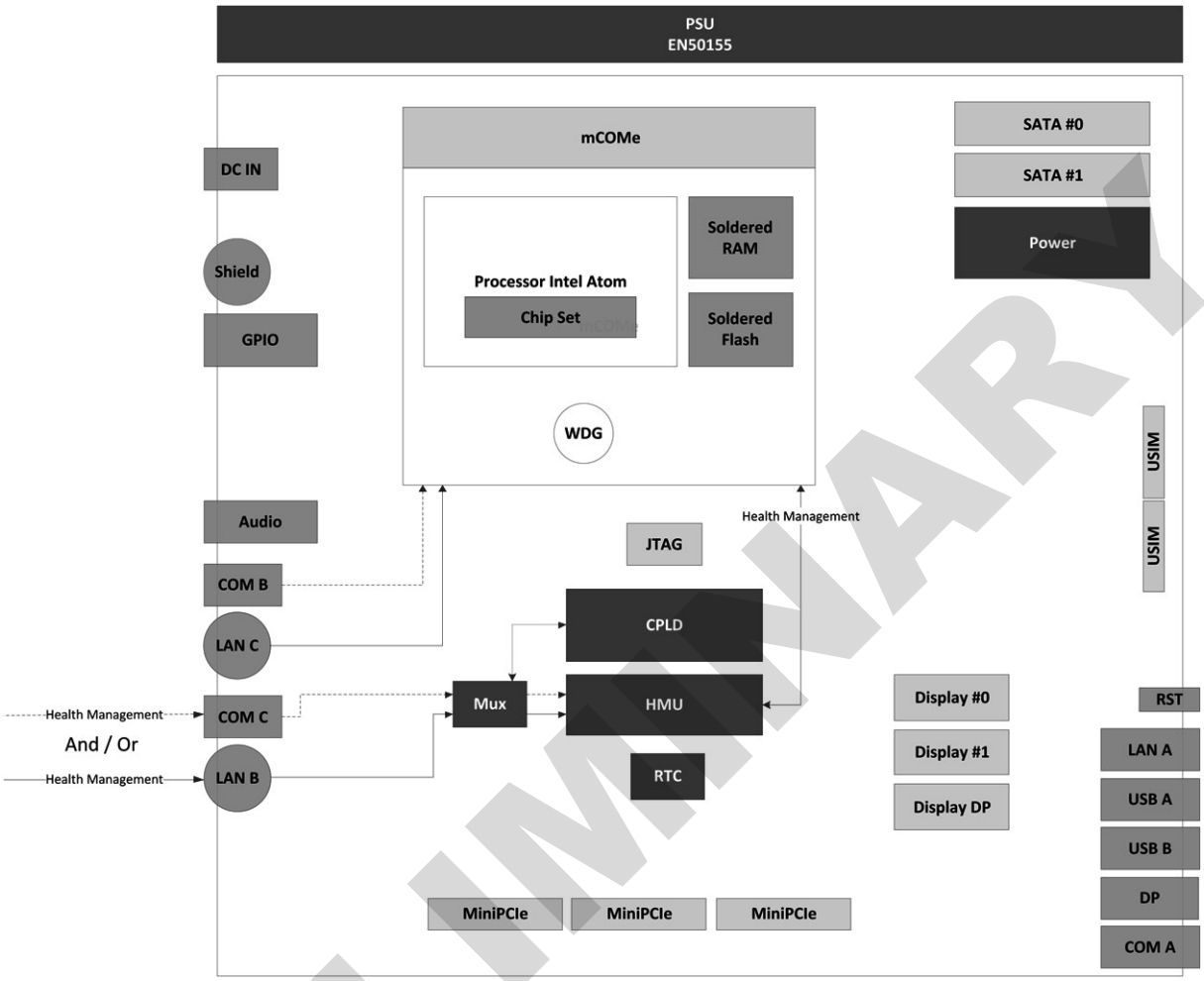


Figure 23: TRACe as a monitored Operational Computer

Refer to section 7.5 “Healh Management Unit” page 56 for more detailed information about HMU.

2.10 Linux

Linux BSP: COMe-mBT10 Linux BSP - Document Revision 010

In addition to the standard Linux distribution, some TRACe specific software is provided (BSP).

- Drivers
  - `trace-cpld`: cPLD driver
  - `trace-cpld-i2c`: bus driver for the I2C bus managed by the cPLD (/dev/i2c-24)
  - `trace-cpld-micro`: driver for communication with HMU
  - `trace-cpld-event`: driver to manage events (ignition signal, ...).
- Services
  - `trace-poweroffd`: daemon managing ignition signal to do an automatic shutdown when switched off
  - `trace-shutdown-script`: template optional script used by `trace-poweroffd` to run some user tasks before final shutdown
- Tools
  - `trace_config`: TRACe configuration tool
  - `trace_cpld_update`: to update the CPLD from a JEDEC file
  - `i2c_transfer`: raw I2C tool to probe, read, write, and debug
  - `port`: to do some read/write accesses to I/O ports
  - `io`: to do some read/write accesses to the memory space

The services and tools listed above must be run as root user.

2.11 Windows

In progress

Chapter 3 - Deploying TRACe B304-TR

3.1 Installing

3.1.1 Mounting Pre-requisites

Because the mounting position may impact thermal and mechanics properties, the TRACe B304-TR system shall be integrated according to the following recommendations:

- Physical Mounting
- Physical Orientation
- Thermal conditions
- Cabling
- Grounding Point Cabling

3.1.2 Physical Mounting

In normal condition of use, the EUT will be mounted on two horizontal mounting brackets (one on each side).

The system shall be attached to the cabinet with four M5 screws (of 12 mm length minimum, assembled with adapted washers, ISO 7093 series recommended). The torque will depend on the thread material.

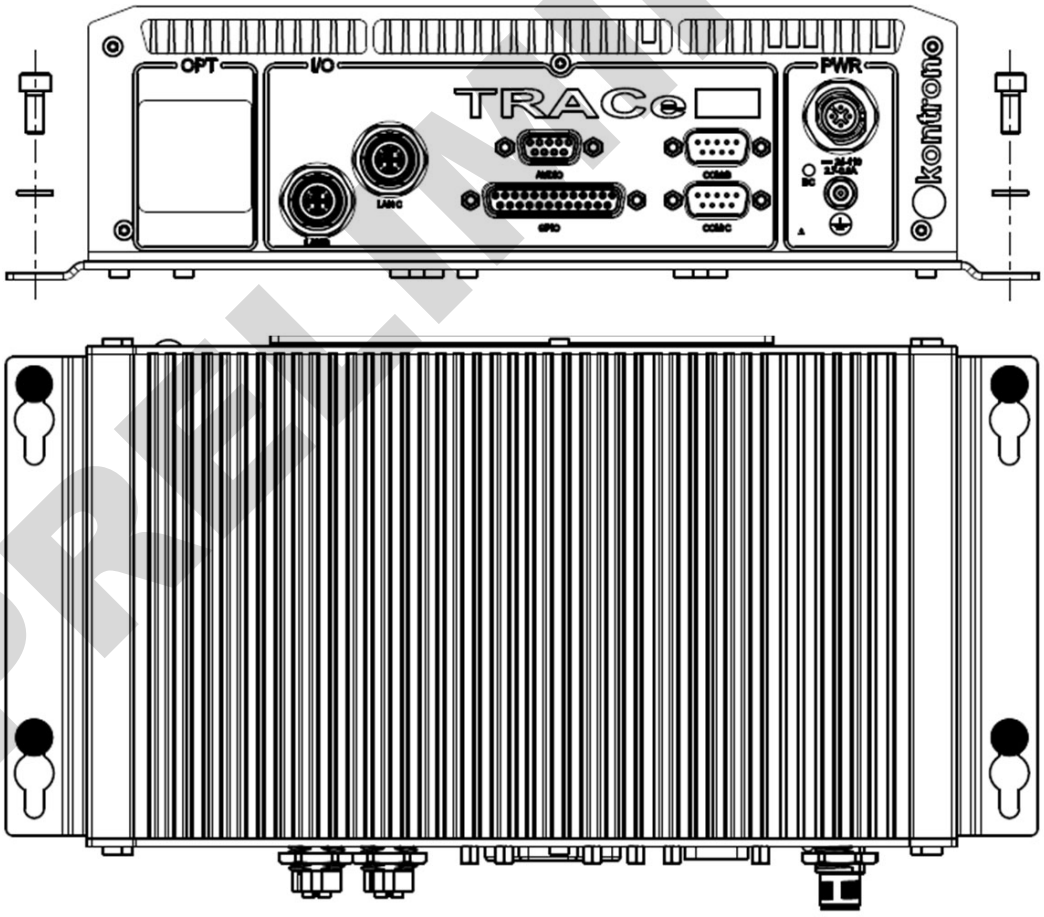


Figure 24: Physical Mounting

3.1.3 Physical Orientation

The equipment is in its normal position of use when axis Z is vertical and upwards oriented as described below.

3.1.4 Horizontal Mount

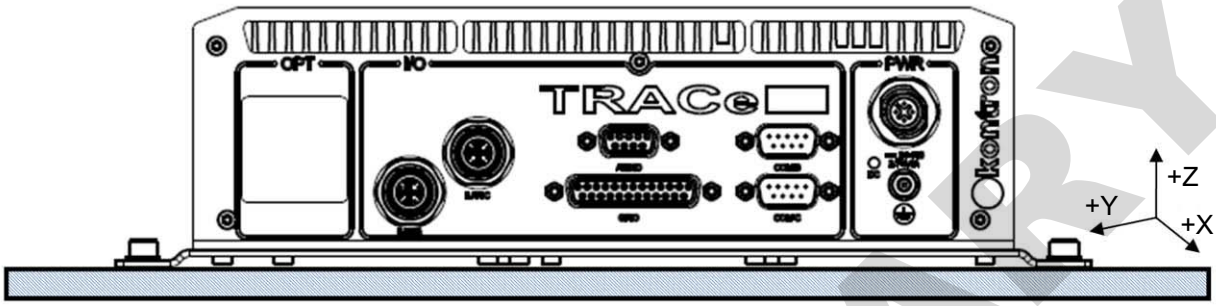


Figure 25: Horizontal Mount

3.1.5 Vertical Mount

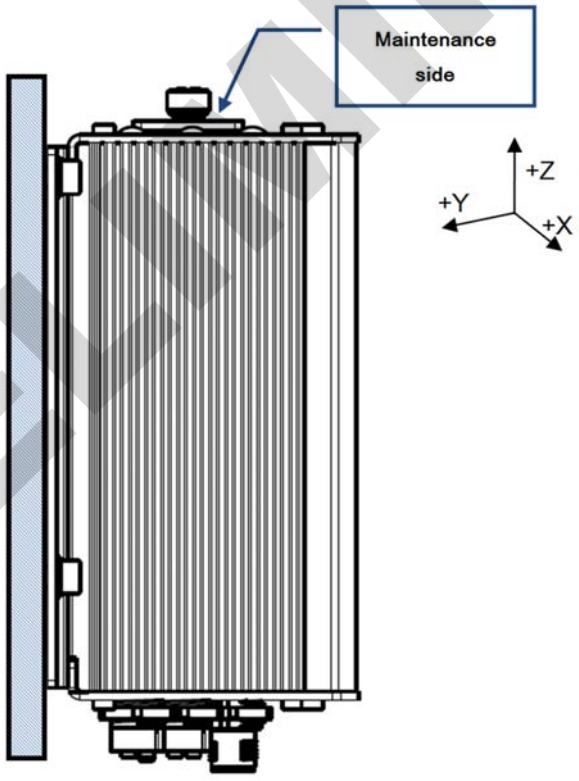
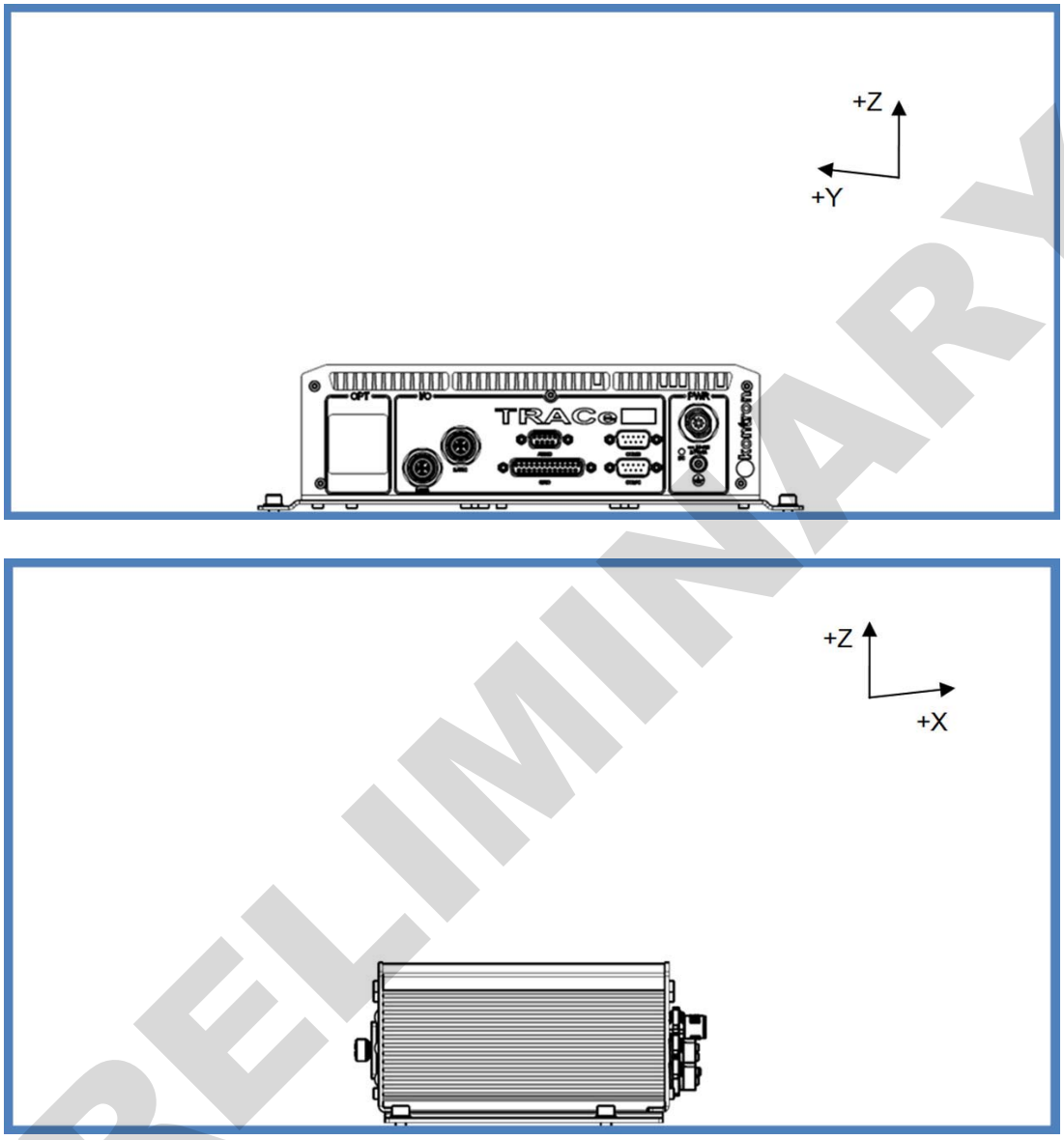


Figure 26: Vertical Mount

3.1.6 Thermal Conditions

To place the Box unit in well conditions, free minimal volume shall be respected around the system:



h is the height of the Box unit. h= 77.5mm

Free volume is defined by the free minimal distances as follows:

- In +X direction: +2*h
- In -X direction: +2*h
- In +Y direction: +2*h
- In -Y direction: +2*h
- In +Z direction: +3*h
- In -Z direction: 0

The air surrounding into the free volume shall not exceed +70°C in continuous and +85°C during 10 min.

3.1.7 Cabling

The Box unit environment shall allow the access to all connectors with consideration of the cables minimum radius. The cables must be of sufficient length as to guarantee that the Box unit can be safely installed or removed from its mounting position and have the cables be installed or removed without the possibility of the Box unit falling or otherwise being damaged.

3.1.8 Grounding Point Cabling

As the operational grounding concept of the TRACe B304-TR calls for a ground point connection of the chassis to external ground, there must always be a ground connection to the chassis.

This is accomplished via an M4 stud with an external ground wire attached installed on the operational plate. Refer to the figure below for an example of assembly details.

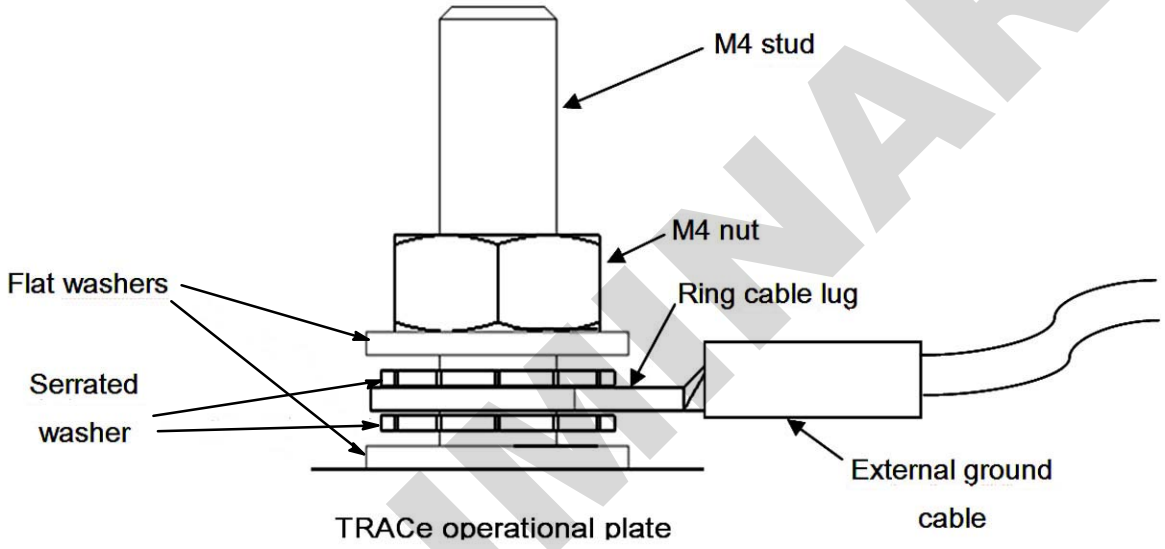


Figure 27: Assembly of the Grounding Point Connection

Grounding Concept

Externally the TRACe B304-TR is grounded via an M4 screw terminal point. From this terminal point a grounding wire must be connected to the vehicle's chassis or a central grounding point.

The following table and figure provide further information concerning TRACe B304-TR grounding.

Interface	Connector	Connector Type	Isolated Interface
Operational			
DIO	GPIO	SUBD25	Yes
Ethernet	LAN B	M12	Yes
Ethernet	LAN C	M12	Yes
Audio	Audio	SUBD9	No
Serial	COM B	SUBD9	Yes
Serial	COM C	SUBD9	Yes
External Ground	Shield Ground	M4	Yes

Interface	Connector	Connector Type	Isolated Interface
Maintenance			
Ethernet	LAN A	RJ45	No
USB 2.0	USB A	USB 2.0	No
USB 2.0 & 3.0	USB B	USB 3.0	No
DP	DP	DP	No
SIM	SIM CARD	SIM CARD	No
Serial	COM A	RJ-12	No
Sockets			
PCIe Mini or mSATA Cards		Depends on mXCards	No

Table 14: TRACe B304-TR Grounding

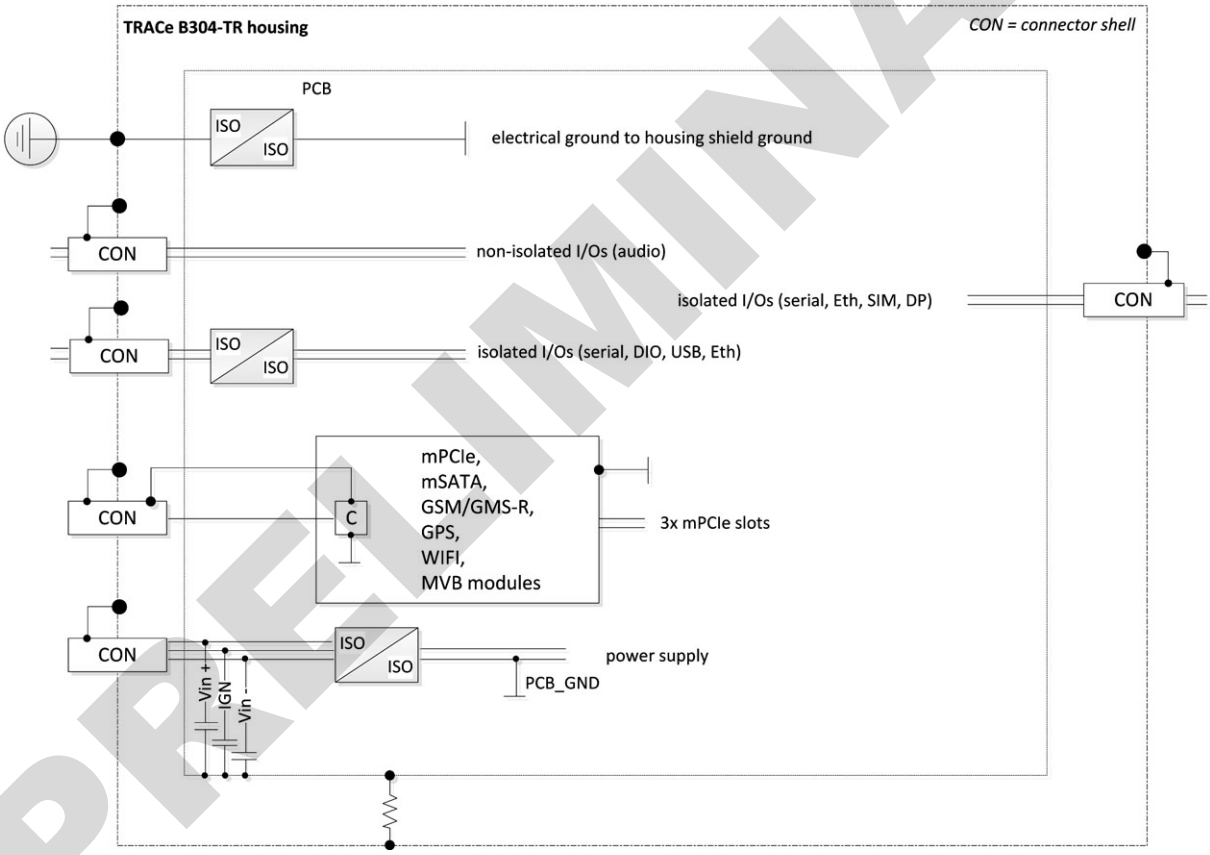


Figure 28: TRACe B304-TR Grounding

3.2 Servicing (Preventive maintenance)

In progress:

TRACe Health Management services will be made available with TRACe Operational Computers. These services will provide information on the status of each TRACe in the field, on line, and through Internet to help user applications in supporting:

- Spare-part logistic management,
- Fleet management,
- Localization of failed equipment,
- Preventive Maintenance,
- Field servicing support,
- Reliability analysis,
- Acceptance Field test.

For now, the HMU can already be used to get some useful information about the health status of the box

Refer to chapter 2.8 “Device Management” page 28, 2.9 “Health Management Unit Use Cases” page 31 and 7.5 “Healh Management Unit” page 56 for more information about HMU.

3.3 Troubleshooting

In progress:

TRACe Health Management services will be made available with TRACe Operational Computers. These services will provide information on the status of each TRACe in the field, on line, and through Internet to help user applications in supporting:

- Spare-part logistic management,
- Fleet management,
- Localization of failed equipment,
- Preventive Maintenance,
- Field servicing support,
- Reliability analysis,
- Acceptance Field test.

For now, the HMU can already be used to get some useful information about the health status of the box

Refer to chapter 2.8 “Device Management” page 28, 2.9 “Health Management Unit Use Cases” page 31 and 7.5 “Healh Management Unit” page 56 for more information about HMU.

Chapter 4 - Updating TRACe

4.1 BIOS

4.1.1 Update BIOS from UEFI Shell using USB device

This section details the update procedure of the TRACe BIOS Firmware. A USB key with the BIOS image to flash and the Firmware Update Utility will be used. Last BIOS image and Firmware Update Utility are provided on EMD Customer Section of the COMe-mBT10 on Kontron Web Site http://emdcustomersection.kontron.com.

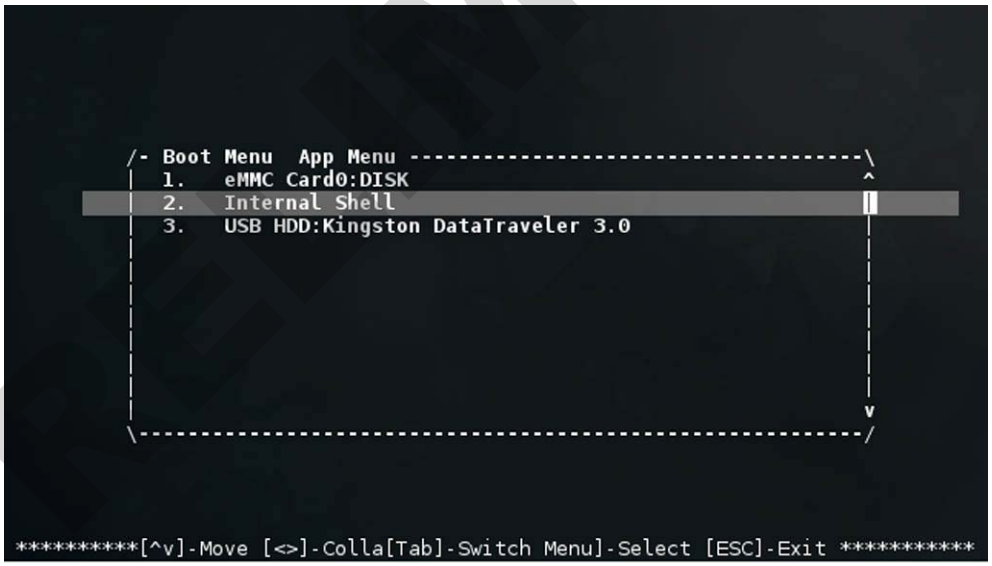
The Firmware Update Utility is included with the zip BIOS image file on Kontron Web site.

Before starting, install the BIOS image to flash and the Firmware Update Utility on a USB key. The USB key must be formatted in FAT32, VFAT or NTFS and shall contents:

- MVV1Rxxx.bin (BIOS image to flash)
- fparts.txt
- fpt64.efi
- flash.nsh

» Operating Mode

Boot TRACe on UEFI shell. If necessary enter the BIOS Boot Menu pressing **<F5>** during the boot sequence. Then navigate and select UEFI shell in Boot override menu and boot under UEFI shell.



Plug the USB device on the concerned USB interface.

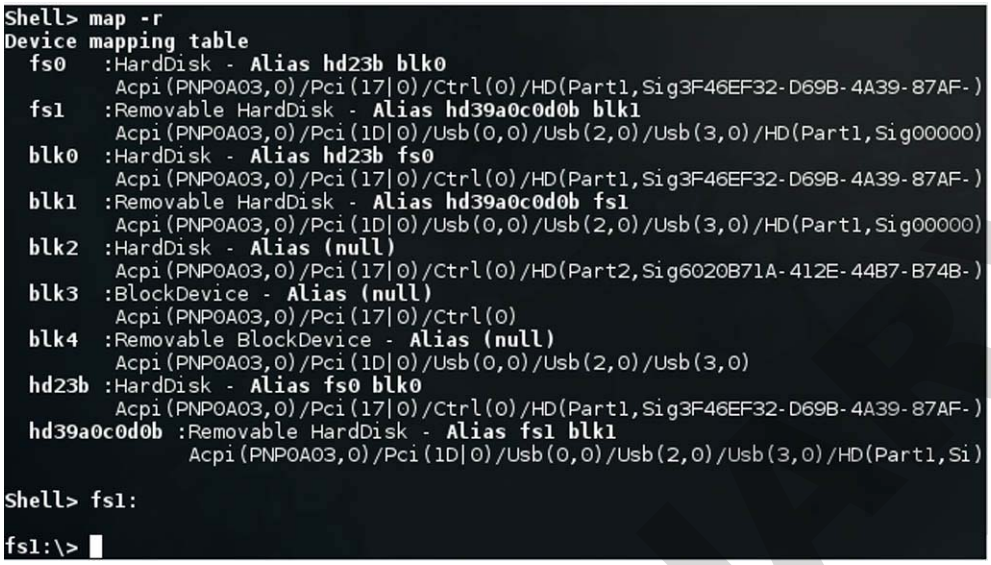
Enter command:

```
map -r
```

Then input the "`fs1`:" command to switch to the root of the USB flash drive. `fs1`: file system must become visible:

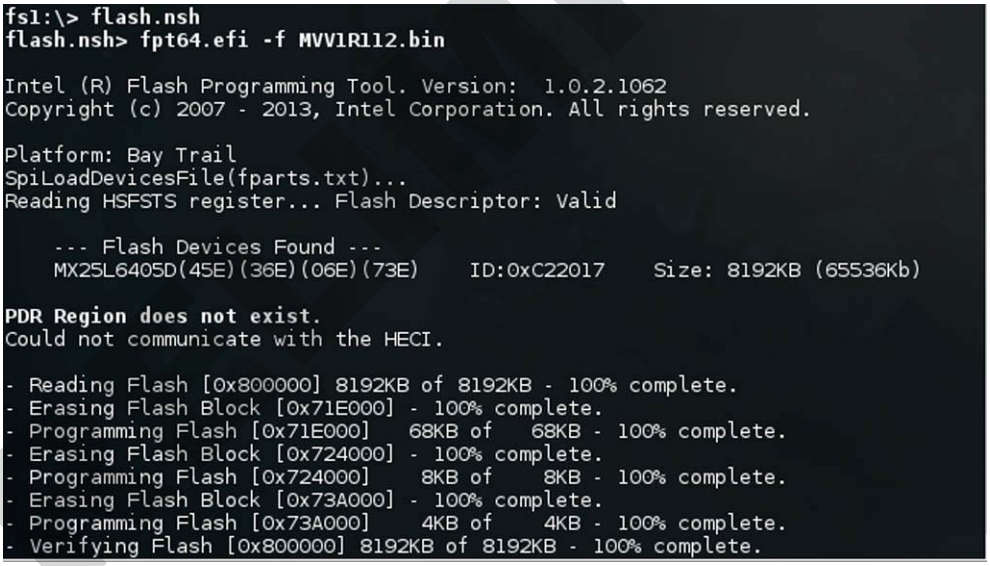
```
fs1:
```

Eventually use "`fs2:`", "`fs3:`" ... in case of other File system devices presence. Use "`cd`" command to reach a directory where the Bios image is stored. Use "`ls`" to display files list.



If BIOS image is named `MVVRxxx.bin` then flash the BIOS entering command:

```
flash.nsh
```



Do not turn off nor reset the board until the end of the command. This prevents the system to boot at next power on.

Wait about 1 minute and 30 seconds and check if message "`RESULT: The data is identical`" is displayed. If not, do not reset and do again the flash update. When upgrade is finished without any errors, then turn off the system and do a fresh cold start in order to boot with the new BIOS.

4.1.2 Record BIOS image ROM and setting from UEFI Shell using USB device

This section details the record of the TRACe BIOS Firmware and its SETUP configuration. A USB key will be used to store the BIOS image.

Before starting install the Firmware Update Utility on a USB key (see previous section to locate them) . The USB key must be formatted in FAT32 ou NTFS and shall contents:

- fparts.txt
- fpt64.efi

Operating Mode

Boot TRACe on UEFI shell. If necessary enter the BIOS Boot Menu pressing **<F5>** during the boot sequence.

Then navigate and select UEFI shell in Boot override menu and boot under UEFI shell.

Plug the USB device on the concerned USB interface

Enter command:

```
map -r
```

Then input the "**fs1:**" command to switch to the root of the USB flash drive. **fs1:** file system must become visible:

```
fs1:
```

Eventually use "**fs2:**", "**fs3:**" ... in case of other File system device presence. Use "**cd**" command to reach a directory where the Bios image will be stored. Use "**ls**" to display files list.

If BIOS wished image name is **TRACe_Vxxx_SETUP.ROM** then dump the current BIOS image entering command:

```
fpt64 -D  TRACe_Vxxx_SETUP.ROM
```

Wait 20 seconds. When finished without error then the BIOS ROM image is stored onto the USB device and ready to be flashed again.

4.1.3 Default BIOS Setting

When a new BIOS is flashed it could be necessary to adjust the BIOS SETUP. Here is the list of BIOS SETUP Modification done for TRACe production compared to the delivered COMe_mBT10 module BIOS image:

In case of doubt first restore the SETUP DEFAULT

> Boot / restore SETUP DEFAULT

Then,

> Setup Advanced / South Cluster Configuration / Audio Controller [Disable]

> Setup Advanced / South Cluster Configuration / Miscellaneous Configuration / State [S5 State]

> Setup Advanced / South Cluster Configuration / LPSS & SCC Configuration / SCC SD Card Support : [Use as GPIO]

> Setup Advanced / OS Selection [Linux]

> Security / TPM Support [Disable]

> Boot / 1. eMMC Card0: disk (eMMC as first boot device)

Then Save and Exit

4.2 CPLD

4.2.1 cPLD Update

The update can be done under Linux using the `trace_cpld_update` tool and a JEDEC file (.jed)

The update takes 3 seconds. Do not power-off while updating !

Then power-cycle the system to start on the new cPLD version.

For example, as root user:

```
[root@trace-board ~]# trace_cpld_update -w < KBOX_C304_TR_PLD_V3.jed
```

4.2.2 Default cPLD settings

The saved settings configured by the `trace_config` tool are loaded by the cPLD at power-on from a non volatile memory. However, if these settings are changed and set to a value not suitable for the system, it may not be possible to run `trace_config` again to recover.

In this case the system must be started in debug mode by pressing the RESET switch on maintenance plate while powering on (VDC applied and IGN on), then by releasing the switch as soon some LEDs are switched on. In this mode, the saved settings are not loaded and the system is started in default configuration.

The Power status LED (front plate) and L5 (maintenance plate) are blinking green twice a second (2 Hz).

On maintenance plate, L1 should be red and L2 green to indicate that the system is in the running state (all PSUs started OK and reset released)

Then `trace_config` can be run again to fix the configuration.

To restore saved settings to defaults in one command:

```
[root@trace-board ~]# trace_config -r
```

When done, just power-cycle.

4.3 Health Management Unit

The microcontroller firmware implementing the HMU can be updated via the network interface LANC.

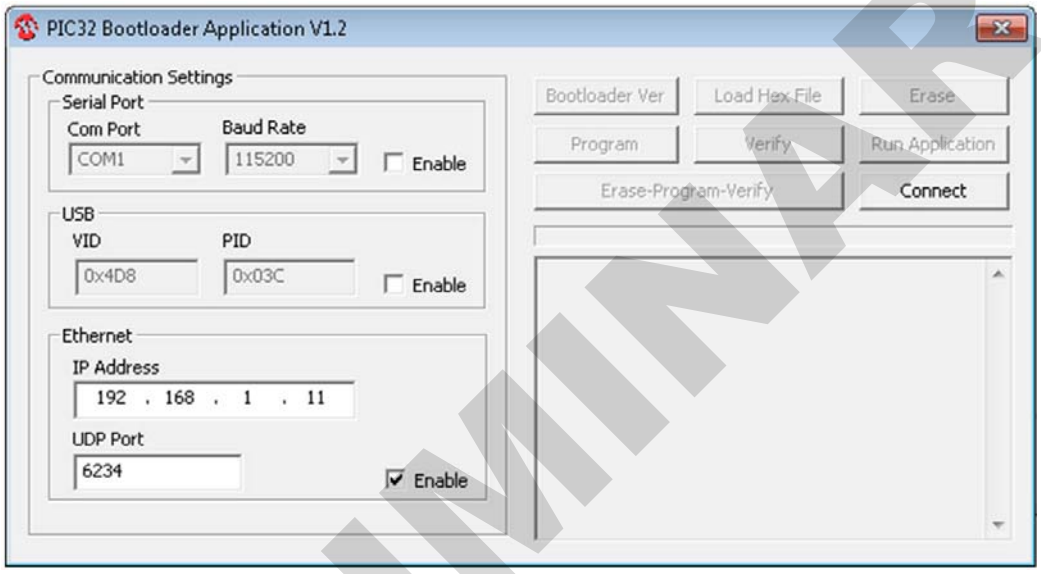
4.3.1 Configuration for Updating HMU Firmware

PC under Windows running the Microchip applicative software: PIC32UBL.

PC must be configured as a server on a subnet 192.168.1, in order to download firmware on the TRACe machine configured by default at the IP Address 192.168.1.11

Launch the PIC32UBL program on PC. The following interface is displayed.

Enable Ethernet Communication setting.



On the TRACe machine log in and type commands:

```
[root@trace-board ~]# trace_config -c --ucctl reset
[root@trace-board ~]# trace_config -c --ucctl boot
[root@trace-board ~]# trace_config -c --lanc uc
```

The first command puts the HMU in reset

The second command sets the HMU in firmware updating mode.

The last command configures the TRACe machine to accept Ethernet traffic towards microcontroller on LANC interface.

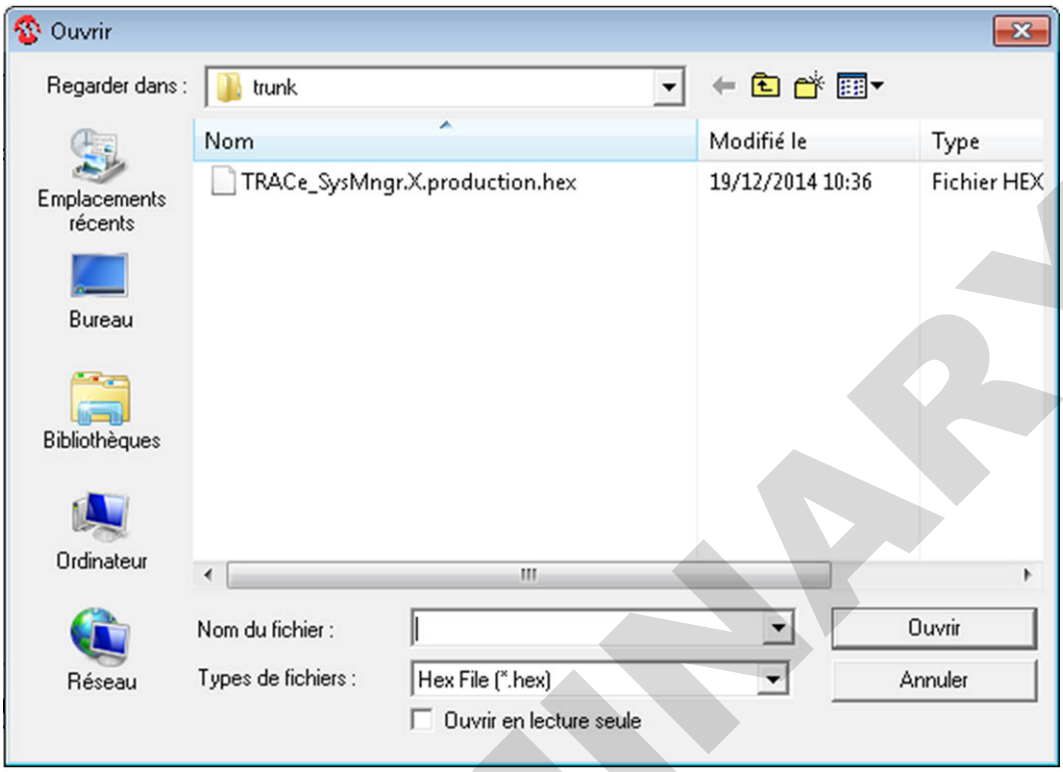
Then in the PIC32UBL interface, press the "`Connect`" button.

The following message is displayed:

```
Device connected
Bootload firmware Version 1.4
```

When in bootloading mode the Maintenance Panel L3 Green LED blinks quickly, press the `Load Hex File` button.

A Popup Browser opens, to select the firmware hex file provided by Kontron:



Navigate to the repository where the file has been uploaded and select it.

```
Hex file loaded successfully
```

Press the Button "**Erase-Program-Verify**".

```
Flash Erased
Programming completed
Verification successful
```

In the TRACe machine terminal type the commands:

```
[root@trace-board ~]# trace_config -c --lanc i210
[root@trace-board ~]# trace_config -c --ucctl reset
[root@trace-board ~]# trace_config -c --ucctl normal
```

The first command re-allocates LANC interface to Gigabit Ethernet interface eth0.

The second command resets the microcontroller.

The third command starts the microcontroller in operational mode.

On the microcontroller serial interface, the new firmware version can be checked with the following command:

```
TRACe SysMngr > show version
TRACe SystMngr version 0.15 (Dec 19 2014,10:22:30)
```

4.4 OS SW

TRACe Fedora 20 live image is available on Kontron Website (TRACe B304 Download section).
By design, TRACe BSP updates come with the COM Express board BSP updates.
Please refer to chapter 7.6 “Linux (BSP)” page 59 and 7.7 “Windows (BSP)” page 65.

Chapter 5 - Getting Help

Help is provided by documentation and Kontron Support (support@kontron.com):

Before contacting Kontron support please collect information on TRACe Machine.

This information can be displayed on HMU serial line by typing the command:

```
TRACe SysMngr > show vpd
```

Chapter 6 - Customizing TRACe B304-TR

(Only for Base Version)

6.1 SSDs

In progress

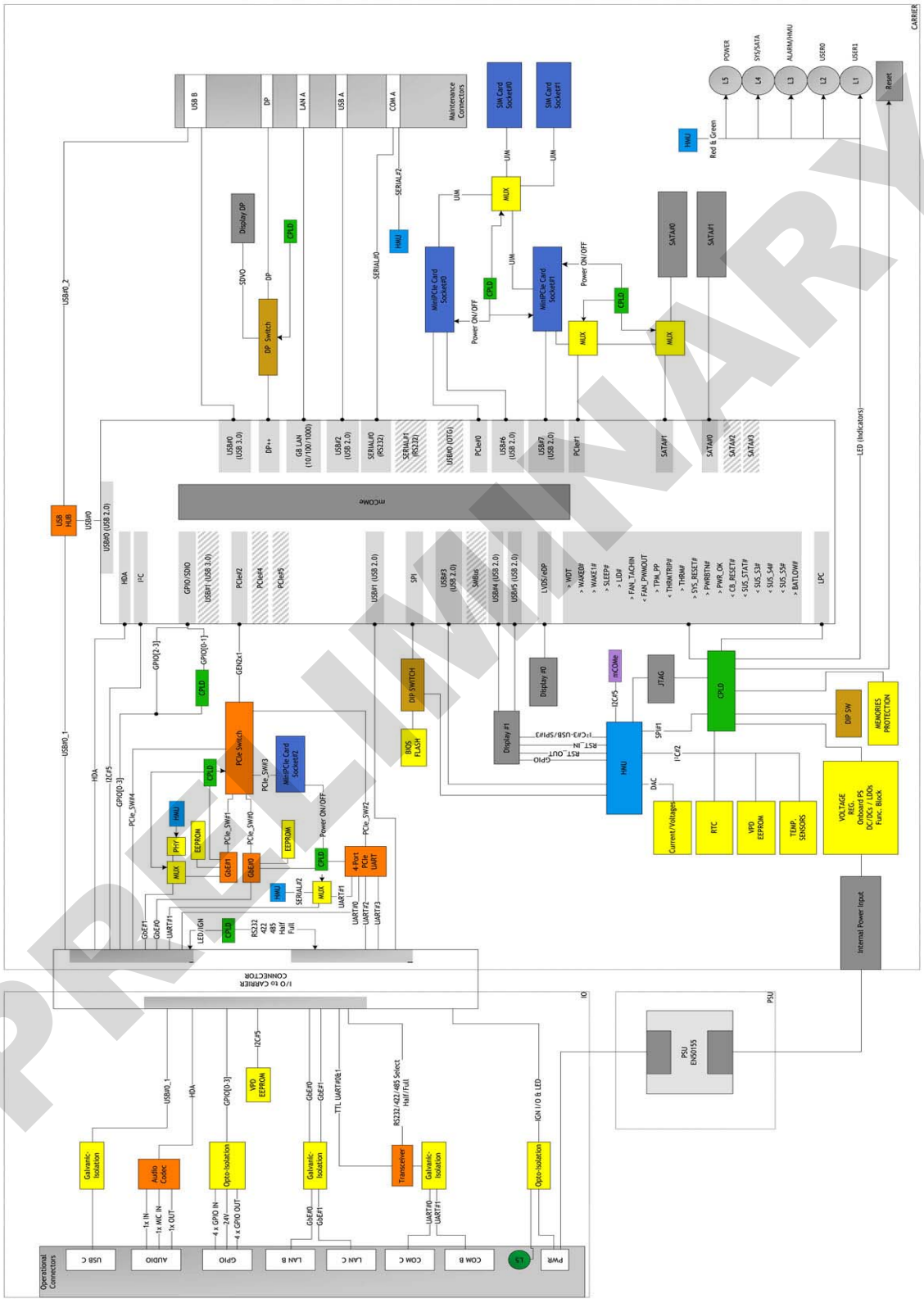
6.2 mPCIe

In progress

6.3 OPT Plate

In progress

Chapter 7 - Reference Information

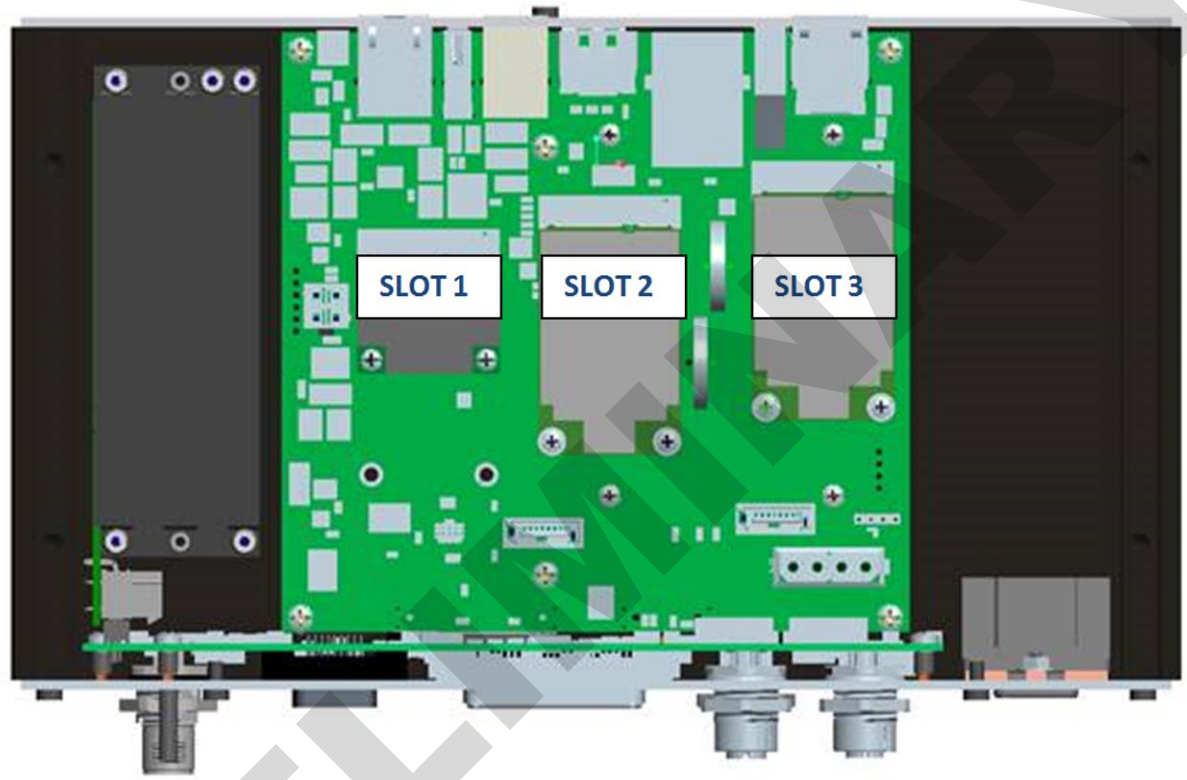


7.1 Mechanical

7.1.1 How to mount a SSD Disk

In progress

7.1.2 How to integrate mPCIe Module



Two sizes and different types are available in the mPCIe market (mini PCI Express standards).

- SLOT 1 (PSU side): both full and half sizes mini PCI Express Cards are supported. But if you choose Full size, the mini PCI Express Cardshall be F2 type (mechanical restrictions).
- SLOT 2: Mini PCI Express Card Full size only, F1 or F2 types.
- SLOT 3: preferred slot for MVB Mini PCI Express Card. It can also be filled with any Mini PCI Express Card Full size only, F1 or F2 types.

7.1.3 Assembly and Dismantling Instructions

In progress

7.2 Onboard Connectors

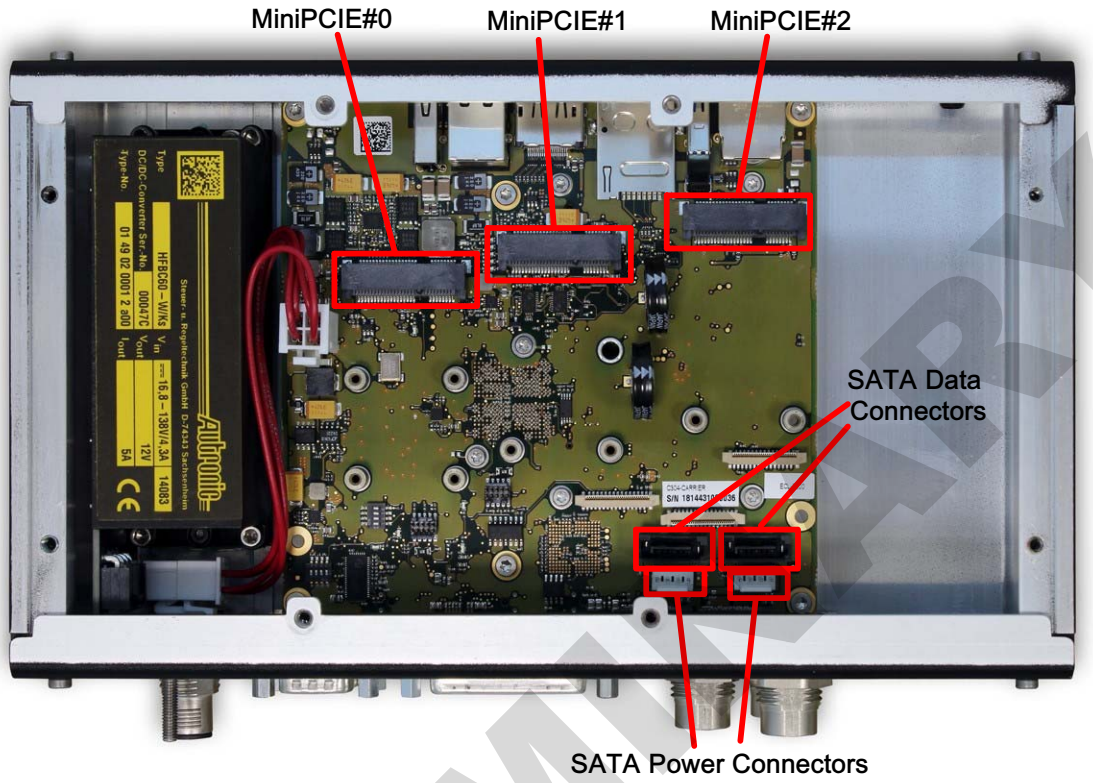


Figure 29: Onboard Connectors

7.2.1 MiniPCIe Connectors

These connectors are compliant with the PCI Express Mini Card Electromechanical Specification Revision 1.2 (Revision 1.2, October 26, 2007).

> MiniPCIE#0 connector:

Accept full or half size of MiniPCIExpress cards and mUSB devices.

> MiniPCIE#1 connector:

Accept only full size of MiniPCIExpress cards, mUSB devices and mSATA modules.

> MiniPCIE#2 connector:

Accept only full size of MiniPCIExpress cards.

7.2.2 SATA DATA Connectors

The following figure and table provide pinout information for the SATA connectors.

Figure 30: Onboard SATA DATA Connectors

PIN	SIGNAL	DESCRIPTION	I/O
1	GND	Ground signal	--
2	SATA_TX+	Differential Transmit +	O
3	SATA_TX-	Differential Transmit -	O
4	GND	Ground signal	--
5	SATA_RX-	Differential Receive -	I
6	SATA_RX+	Differential Receive +	I
7	GND	Groudn Signal	--

Table 15: Onboard SATA DATA Connectors Pinout

7.2.3 SATA Power Connectors

The following figure and table provide pinout information for the SATA power connectors.

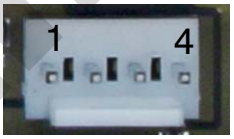


Figure 31: Onboard SATA Power Connectors

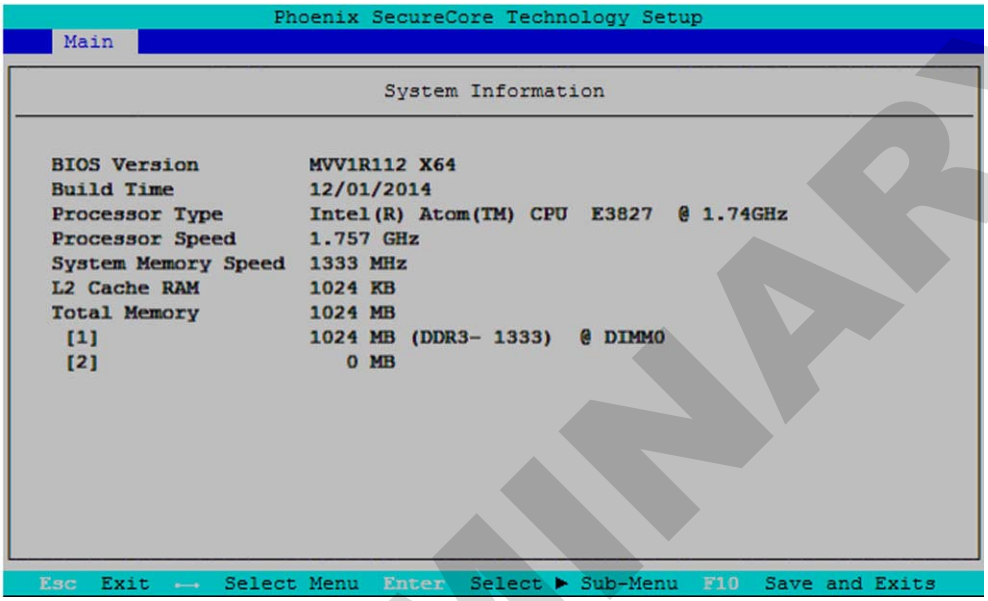
PIN	SIGNAL
1	+5V
2	GND
3	GND
4	+12V

Table 16: Onboard SATA Power Connectors Pinout

7.3 BIOS

BIOS Version

The BIOS version is accessible in DMI table under OS (dmidecode for Linux). It is also available in BIOS SETUP in system information in Main menu.



BIOS on Serial Line

By default the BIOS console does not show up on COM A or COM B. To have the BIOS accessible on serial line the SETUP option "`Console redirection`" in MAIN menu must be enabled on COM A or COM B.

However enabling this option will strongly slow down the Graphical BIOS access. This is a BIOS limitation on TRACe. So this option must be set only if graphical BIOS access is not used. Also the serial line speed must be set to 115200 (it is 9600 by default) to access the BIOS SETUP by serial line and to avoid to considerably slow down a verbose Linux boot.

7.4 CPLD

The cPLD (implemented on the carrier board) implements some registers mapped to the LPC bus.

These registers can be accessed at I/O base address 0x800 + register offset (0x00 to 0x3F)

```
0x00-0x0F : MISC. REGISTERS      : managed by the trace_config tool
0x10-0x15 : I2C REGISTERS        : managed by the trace-cpld-i2c driver
0x20-0x29 : SPI REGISTERS        : managed by the trace-cpld-micro driver
0x30-0x35 : cPLD FLASH REGISTERS : managed by the trace_cpld_update tool (for cPLD update)
```

Please concact Kontron for a detailed description of these registers.

7.5 Healh Management Unit

7.5.1 Overview

The Health management unit implemented in a Microchip PIC32 microcontroller provides the following management facilities:

- **Inventory**: Vital Product Data of the TRACe machine.
- **Supervision**: monitoring of thermal sensors, voltage sensors, health status of internal interfaces (I2C bus, devices, log events, …).
- **Control Management**: This feature will be implemented later.

All alarm/alert events are backuped in EEPROM area. The log area is a cyclic pool of 256 events. Each event has a 64-byte length including date stamp.

Currently the HMU interface is provided on Serial port RJ-12 on the Maintenance side.

Parameters for this serial line interface are: 9600 bauds, 8-bit, No Parity, No flow Control.

7.5.2 Basic Commands

Globally commands are listed by:

```
TRACe SysMngr > help TRACe

 *** show: Show TRACe information ***
 *** set: Set TRACe information ***
 *** debug: Debug TRACe functionalities (RESERVED USE) ***
```

7.5.2.1 Inventory

```
TRACe SysMngr > show vpd
```

And its subcommands:

```
TRACe SysMngr > show vpd system
TRACe SysMngr > show vpd carrier
TRACe SysMngr > show vpd IOB
TRACe SysMngr > show vpd come
```

List and syntax of subcommands are provided by:

```
TRACe SysMngr > show vpd help
```

VPD can be processed by the command:

```
TRACe SysMngr > set vpd
```

List and syntax of subcommands are provided by:

```
TRACe SysMngr > set vpd help
Usage : set vpd <parameter> [<parameters> ...]
    with parameter :
      system  : TRACe system VPD with <parameters :
      carrier : Carrier VPD
      come    : COMexpress VPD
      IOB     : IO Board VPD
      init    : initialize VPD areas in eeprom
```

7.5.2.2 Supervision

```
TRACe SysMngr > show temp
######### Temperatures ##########
Carrier Therm Sensor : 43 degC
COMe Therm Sensor    : 39 degC
PSU Therm Sensor     : 40 degC
```

Displays the temperature inside the TRACe system.

```
TRACe SysMngr > show volt

######### Voltages ##########
5V_STDBY          : 5000 mV
12V               : 11362 mV ALARM : below voltage limit
3V3               : 3352 mV
3V3_STDBY         : 3502 mV ALARM : above voltage limit
5V                : 5039 mV
######### Current ##########
12V_CURRENT_SENSE : 970 mA
```

Displays the voltage and current level (the ALARM messages are examples).

```
TRACe SysMngr > show cbit
######### CBIT STATUS ##########
     I2C Carrier Errors 0
     I2C IOB Errors 0
     Thermal sensor Carrier Therm Sensor status : OK
     Thermal sensor COMe Therm Sensor    status : OK
     Thermal sensor PSU Therm Sensor     status : OK
     I2C Carrier alive
     I2C issue on IO Board
     COMe Port80 status: 0x0
```

Displays the status of miscellaneous health parameters of the systems.

```
TRACe SysMngr > show logs
11/03/15 14:32:39 :
WARNING: 3V3_STDBY          limit reached (3486 mV)
11/03/15 14:32:38 :
WARNING: 12V                limit reached (11362 mV)
11/03/15 14:32:33 :
Startup
11/03/15 14:32:26 :
Startup
11/03/15 14:32:17 :
Startup
```

Displays the recorded warnings or alarm events of the system (ALARM events are examples).

```
TRACe SysMngr > set date 00 48 14 3 11 03 15
TRACe SysMngr > show date
11/03/15 14:48:04
```

Sets and shows date for events recording.

7.5.2.3 Control Management

Power Management, Reset Management: to be defined later according to a predefined policy.

7.5.2.4 Alarm Management

When a monitored event (thermal, voltage, current, interface health …) is out of its limits or in default, an interrupt (IRQ10) is generated towards the COMe board via the CPLD.

This interrupt must be handled on COMe board.

For example under Linux:

- **Wait on event** (blocking command) is performed by:

```
[root@trace-board ~]# cat < /sys/class/trace-cpld-event/event/wait2
```


Device "wait" is reserved for the trace-poweroffd daemon, so use "wait2" or "wait3" here.

- **Read the status of the event** (non-blocking command) is done by:

```
[root@trace-board ~]# cat < /sys/class/trace-cpld-event/event/get
```

The data returned is based on the information in CPLD register REG_POWER @0x0B :

```
<ign key switched off ?> <power forced off by FORCE_OFF bit ?> <event from IRQ10_SET bit ?>
```

For example , it can be:

```
0 0 1
```

In case of HMU alert.

7.6 Linux (BSP)

7.6.1 BSP Contents

This distribution includes the standard Fedora 20 Linux release as well as the BSP packages related to the common platform COMe-mBT10 and some additional specific drivers for TRACe system.

7.6.1.1 OS Release

- **Base Distribution** . . . . . Fedora 20
- **Package Management** . . . . . YUM/RPM
- **Distribution Website** . . . . . http://www.fedoraproject.org
- **Linux Kernel** Linux-3.15
- **X-Server** . . . . . Xorg 1.14
- **Default Graphical Environment** . . . . . LXDE

7.6.1.2 COMe BSP

The COMe-mBT10 BSP is available through the customer section on the Kontron webpage:
http://www.kontron.com/products/computeronmodules/com-express/com-express-mini/come-mbt10/emd

Full description of the following drivers and instructions for installation are provided in the corresponding README and INSTALL files.

Here the summary of the COMe-mBT10 BSP features:

> **Kempld-drivers: Kontron PLD drivers to support following features:**
  - PLD core - needed by all other PLD drivers (`mfd-kempld`)
  - GPIO (`gpio-kempld`)
  - I2C (`i2c-kempld`)
  - Watchdog (`kempld_wdt`)

> **Kontron-drivers**
  - Backlight (`kontron_bl`): supports Backlight control using PWM and I2C, depending on the BIOS backlight configuration. This driver is also an alternative to 7 other PWM drivers possibly available through the graphics driver and ACPI.
  - Bootcounter (`kontron-bootcounter`): driver to access the board internal bootcounter through the sys file system.
  - Embedded EEPROM User Area (`kontron_eeep`): driver to access the persistant data storage within the configuration EEPROM.

> **nct7802-driver**
  - Driver to access the hwmonitor on the module

It is packaged through several RPM files.

- **kontron-ci-*.noarch.rpm** Kontron specific modifications to the base system (Theme changes, Driver configuration, System configuration).
- **kernel-mvv1-*.x86_64.rpm** Product specific kernel and kernel development packages for 64 bit systems.

- **kernel-mvv1-*.i686.rpm** Product specific kernel and kernel development packages for 32 bit systems.
- **perf-*.x86_64.rpm** Product/kernel specific performance counter tools for 64 bit systems.
- **perf-*.i686.rpm** Product/kernel specific performance counter tools for 32 bit systems.
- **python-perf.*.x86_64.rpm** Product/kernel specific performance counter (support module for 64 bit systems)
- **python-perf.*.i686.rpm** Product/kernel specific performance counter (support module for 32 bit systems)
- **kernel-bhl6-*.src.rpm** Product specfic kernel source package
- **kontron-ci-*.src.rpm** Source package for the Kontron specific modifications to the base system.

7.6.1.3 TRACe Specific Drivers

Four modules are provided for a full support of the TRACe system:

- **trace-cpld:** cPLD driver
- **trace-cpld-i2c:** Bus driver for the I2C bus managed by the cPLD
- **trace-cpld-event:** Driver to manage events (ignition signal, ...).
- **trace-cpld-micro:** Driver for communication with HMU (Non standard SPI protocol.)

7.6.2 Network Configuration

Network configuration is done with the legacy network service through configuration files under `/etc/sysconfig/network-script` directory.

Port Name	Linux Name	IP address
LAN A	Eth2	192.168.1.1
LAN B	Eth0	Not configured
LAN C	Eth1	Not configured

In order to configure a WIFI module, the service NetworkManager shall be used instead of network one.

Use the following command lines through a terminal:

```
# systemctl stop network
# systemctl disable network
# systemctl unmask NetworkManager
# systemctl enable NetworkManager
# systemctl start NetworkManager
```

Now the network can be configured with a graphical windows.

7.6.3 Tools

7.6.3.1 trace_config: TRACe Configuration Tool

```
[root@trace-board ~]# trace_config -h
```

Usage: trace_config [OPTION]...

TRACe configuration tool V1.5.

Options:

`-h, --help` : Get help.

`-c, --current` : Work on current settings (volatile runtime settings) instead of default behaviour that is to work on saved settings (non volatile default settings).

`-s, --saved` : To be used with --current to also work on saved settings in addition to current settings.

`-d, --debug` : Also print debug settings, including for this help.

`-r, --reset` : Reset (saved and/or current) settings to defaults, including debug settings if --debug also specified.

Current settings are loaded from saved settings at power-on. Some settings do not support modification of their current (runtime) value; only modification of their saved value is allowed.

The list below shows all valid options/arguments pairs that can be used on command line after the ones listed above.

If none is provided, this program displays all settings (saved and/or current).

If only options are supplied (without argument), only the related settings are displayed.

If both options/arguments are supplied, the related settings are updated.

Several options/arguments can be supplied in the same command line.

```
--serial     232          : RS232 mode on COM-B/COM-C serial lines
--serial     485          : RS422/485 mode on COM-B/COM-C serial lines
--serial     full         : Full duplex on COM-B/COM-C serial lines
--serial     half         : Half duplex on COM-B/COM-C serial lines
--tpm        on           : Second TPM chip ON
--tpm        off          : Second TPM chip OFF
--poweron    start        : Start when ignition key is switched ON
--poweron    wait         : Wait GPI/uC event when ignition key is switched ON
--dport      maint        : DisplayPort on maintenance plate connector
--dport      j2602        : DisplayPort on J2602
--sata       mini1        : SATA interface to mini socket #1
--sata       j2201        : SATA interface to J2201 connector
--sim        0a1b         : mini socket #0 to SIM-A + socket #1 to SIM-B
--sim        1b           : mini socket #1 to SIM-B
--sim        0a           : mini socket #0 to SIM-A
--sim        0b           : mini socket #0 to SIM-B
--gpi1wake   off          : Wakeup from GPI1 NOT enabled
--gpi1wake   on           : Wakeup from GPI1 enabled
--gpi0wake   off          : Wakeup from GPI0 NOT enabled
--gpi0wake   on           : Wakeup from GPI0 enabled
--lanc       i210         : LAN-C connector for Intel i210 ethernet
--lanc       uc           : LAN-C connector for microcontroller ethernet
--comb       uart         : COM-B connector for PCIe UART
```

```
 --comb       uc            : COM-B connector for microcontroller console
 --offdelay   <value>       : Power off delay in units of 1/4 seconds (0 to 255)
 --mini0      present       : Mini socket #0 PCIe device present
 --mini0      absent        : Mini socket #0 PCIe device NOT present
 --mini1      present       : Mini socket #1 device present (mPCIe or mSATA)
 --mini1      absent        : Mini socket #1 device NOT present (mPCIe or mSATA)
 --mini1sata  present       : Mini socket #1 SATA device present
 --mini1sata  absent        : Mini socket #1 SATA device NOT present
 --mini2      present       : Mini socket #2 PCIe device present
 --mini2      absent        : Mini socket #2 PCIe device NOT present
 --mode       normal        : System running in normal mode
 --mode       debug         : System running in debug mode
 --ledsysr    off           : LED SYS red OFF
 --ledsysr    on            : LED SYS red ON
 --ledalarmr  off           : LED ALARM red OFF
 --ledalarmr  on            : LED ALARM red ON
 --ledusr1    off           : LED USER1 is OFF
 --ledusr1    red           : LED USER1 is RED
 --ledusr1    green         : LED USER1 is GREEN
 --ledusr1    amber         : LED USER1 is AMBER
 --ledusr0    off           : LED USER0 is OFF
 --ledusr0    red           : LED USER0 is RED
 --ledusr0    green         : LED USER0 is GREEN
 --ledusr0    amber         : LED USER0 is AMBER
 --sysstate   <value>       : Current system state code (0 to 15, updated by soft)
 --cpldrev    <hexvalue>    : cPLD revision/version on carrier board
[root@trace-board ~]#
```

7.6.3.2 trace_cpld_update: cPLD Update Tool (Carrier Board)

```
[root@trace-board ~]# trace_cpld_update
```

`trace_cpld_update`: cPLD update utility

`-h`	Help
`-c`	Check image in cPLD is valid
`-j`	Convert a .jed file (from stdin) to a binary (to stdout)
`-r`	Readback cPLD in binary format (to stdout)
`-v`	Verify that image in cPLD matches the .jed file (from stdin)
`-w`	Program cPLD from .jed file (from stdin)

> Examples:

```
    trace_cpld_update -c
    trace_cpld_update -j < file.jed > file.bin
    trace_cpld_update -r > readback.bin
    trace_cpld_update -v < file.jed
    trace_cpld_update -w < file.jed
[root@trace-board ~]#
```

7.6.3.3 trace-poweroffd / trace-shutdown-script

These scripts located in `/usr/local/bin` are used to implement an automatic system shutdown when the ignition signal is switched off.

The `trace-poweroffd` script should be used as a daemon started automatically at system boot.

The `trace-shutdown-script` script can be modified to add some user specific tasks to do before the final shutdown occurs.

7.6.4 I/Os

7.6.4.1 COM devices routing

```
-dev-----dmesg/lspci---------chip--------------connector------------ressources---------------
ttyS0 : 00:04         : COMe UART port 0    : COM-A connector   # @ I/O 0x3f8, IRQ 4
ttyS1 : 00:05         : COMe UART port 1    : NC                # @ I/O 0x2f8, ORQ 3
ttyS2 : 0000:07:00.0 : carrier UART port 2 : NC                # @ MMIO 0x90500800, IRQ 17
ttyS3 : 0000:07:00.0 : carrier UART port 3 : NC                # @ MMIO 0x90500c00, IRQ 17
ttyS4 : 0000:07:00.0 : carrier UART port 0 : COM-C connector   # @ MMIO 0x90500000, IRQ 17
ttyS5 : 0000:07:00.0 : carrier UART port 1 : COM-B connector   #  @  MMIO  0x90500400,  IRQ  17
                                                                        (muxed with HMU console)
```

7.6.4.2 LAN devices routing

```
-dev-----dmesg/lspci-------chip--------------connector----
eth0  : 0000:05:00.0     : carrier i210-B    : LAN-C connector  (muxed with HMU ethernet)
eth1  : 0000:06:00.0     : carrier i210-A    : LAN-B connector
eth2  : 0000:0a:00.0     : COMe i210         : LAN-A connector
```

7.6.4.3 GPIOs

The `gpio-kempld` driver manages 8 COMe GPIOs that are available on the SUBD25 connector on the operational side.

Before beeing used, these GPIOs must be configured as follows (4 as outputs, 4 as inputs):

```
[root@trace-board ~]# echo  248 > /sys/class/gpio/export
[root@trace-board ~]# echo  249 > /sys/class/gpio/export
[root@trace-board ~]# echo  250 > /sys/class/gpio/export
[root@trace-board ~]# echo  251 > /sys/class/gpio/export
[root@trace-board ~]# echo  252 > /sys/class/gpio/export
[root@trace-board ~]# echo  253 > /sys/class/gpio/export
[root@trace-board ~]# echo  254 > /sys/class/gpio/export
[root@trace-board ~]# echo  255 > /sys/class/gpio/export
```

```
[root@trace-board ~]# echo  out > /sys/class/gpio/gpio252/direction  # GPIO_OUT[0]
[root@trace-board ~]# echo  out > /sys/class/gpio/gpio253/direction  # GPIO_OUT[1]
[root@trace-board ~]# echo  out > /sys/class/gpio/gpio254/direction  # GPIO_OUT[2]
[root@trace-board ~]# echo  out > /sys/class/gpio/gpio255/direction  # GPIO_OUT[3]
```

```
[root@trace-board ~]# echo  in > /sys/class/gpio/gpio248/direction   # GPIO_IN[0]
[root@trace-board ~]# echo  in > /sys/class/gpio/gpio249/direction   # GPIO_IN[1]
[root@trace-board ~]# echo  in > /sys/class/gpio/gpio250/direction   # GPIO_IN[2]
[root@trace-board ~]# echo  in > /sys/class/gpio/gpio251/direction   # GPIO_IN[3]
```

Then the value of each GPIO can be set or read using a `/sys/class/gpio/gpio<number>/value` device.

> Examples:

- Set GPIO_OUT[0] active (drives open collector output to 0):

```
[root@trace-board ~]# echo 1 > /sys/class/gpio/gpio252/value
```

- Read level on GPIO_IN[0]

```
[root@trace-board ~]# cat /sys/class/gpio/gpio248/value
0
```

7.7 Windows (BSP)

Windows BSP for Windows 7, Windows 8 and Windows 7 Embedded in 32 or 64 bits are available through the customer section on Kontron COMe-mBT10 webpage:

http://www.kontron.com/products/computeronmodules/com-express/com-express-mini/come-mbt10/emd

7.7.1 Feature supported by BSP

The BSP delivers third party drivers like

- Chipset
- Ethernet
- Graphic
- USB 3.0
- Atom IO driver for GPIO, I2C, SPI, HS-UART, SD2
- SATA
- Audio Controller Intel® High Definition Audio
- TPM (TXE driver)

and some Kontron adapted drivers for

- 4 GPI and 4 GPO
- SM BUS
- Watchdog (reset, interrupt or timer mode)
- NCT7802 HW Monitor for Voltage (3V3, VBAT,12V, 5V)
- EEPROM R/W
- I2C
- BootCounter
- BoardInformation
- SPI
- Temperatures CPU-Temp and SYS-Temp

Many specific Kontron features accesses are implemented using the Kontron API (KEAPI) driver.

The driver access is specified in KEAPI Specification (see documentation into BSP). A demonstrative command tool is delivered:

`ktool32.exe` or `ktool64.exe`

The following display shows the `ktool` command syntax:

```
C:\Program Files\Kontron\Kontron EAPI>ktool32.exe

Usage: ktool <API class> <API name> [<command_type_args>] [-h]
        Available API classes:
                bat - battery functions;
                cpu - cpu functions;
                disk - disk functions;
                disp - display functions;
                eep - eeprom functions;
                fan - fan functions;
                gen - general functions;
                gpio - gpio functions;
                i2c - i2c functions;
                mem - memory functions;
                net - network info functions;
                pci - pci info functions;
                perf - performance functions;
                smbus - smbus functions;
                spi - spi functions;
                temp - temperature sensors functions;
                volt - voltage sensors functions;
                wdt - watchdog functions
```

To learn more about API class args:

```
$ ktool <API class> -h
```

The Wake up from Suspend is supported under Windows (see section 2.7.1 - Plug / Suspend the system page 23)

7.7.2 Features not yet supported by Windows BSP

The following features are not yet supported by Kontron Windows BSP:

- MicroController (HMU) communication (Non standard SPI communication)
- Alarm Management IRQ10 event
- LM73 * 3 temperature sensors
- Specific CPLD access for Board Controlling (the services available with the Linux command `Trace_config` are not yet adapted for Windows)
- COM B and COM C or driver for XR17V354 Pcie UART but driver is available on www.exar.com.

7.8 System

7.8.1 Power Management

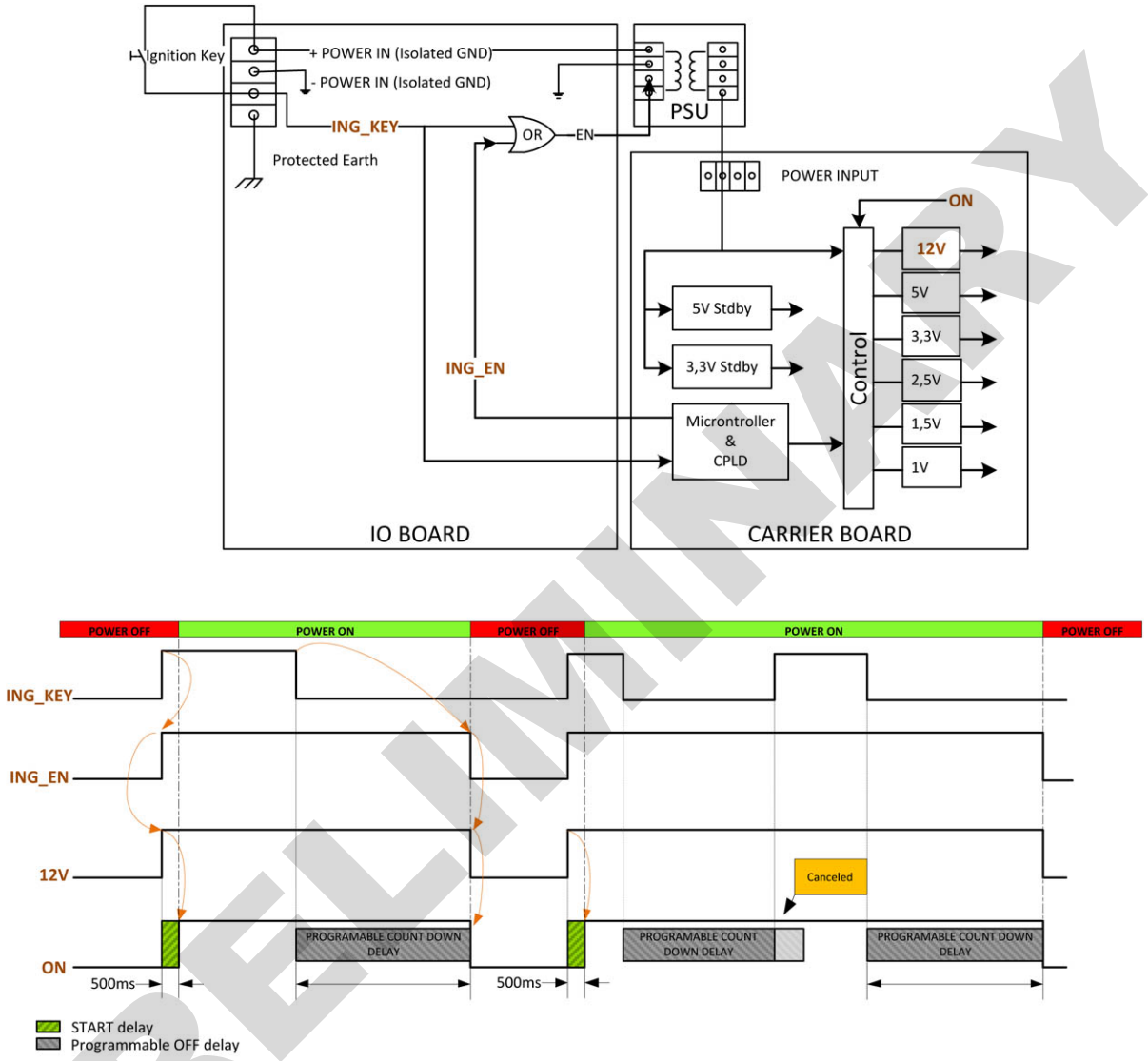


Figure 32: Ignition Implementation

7.9 Standards Compliance

The TRACe system complies with the following standards:

- NF EN50121-3-2
- NF EN50127
- NF EN50128
- NF EN50155 :2007
- EN 50155 : 2007
- EN 55011 : § 12.2.8.2
- NF EN 60068-2-1 :2007,
- NF EN 60068-2-2 :2007
- NF EN 60068-2-11 :1999
- NF EN 60068-2-27 :2009.
- NF EN 60068-2-30 :2006
- NF EN 60068-2-64 :2008
- NF EN 60529 :2000
- EN 60950-1 :2006+A1 :2010+A2 :2013+ A11 :2009+A12 :2011
- EN 61000-4-2
- EN 61000-4-3
- EN 61000-4-4
- EN 61000-4-5
- EN 61000-4-6
- NF EN 61373 :2011-04

Appendix A - References

A.1 Associated Documentation

The following documentation is available on the Kontron web site.

- Datasheet TRACe B304-TR . . . . . #06092014MB
- TRACe B304-TR Quick Start SD.DT.G39

A.2 Accessories References Examples

M12 Connector for Power Cable:

- Vendor: **Phoenix contact** / Reference : 1521601

http://fr.rs-online.com/web/p/connecteurs-et-cables-pour-interrupteurs-et-capteurs/6528201/

- Vendor: **Weidmuller** / Reference: 9457240000

http://catalog.weidmueller.com/procat/Product.jsp;jsessionid=408DEB4DCB7EDC2E0F7B518824DAE36B?productId=(%5b9457240000%5d)&page=Product

Ethernet M12 to RJ45 Cable:

- Vendor : **Phoenix Contact** / Reference : 1407471

https://eshop.phoenixcontact.net/phoenix/treeViewClick.do;jsessionid=TXZV8bq4RbGyRkRpdtxQJv1pnRShypTW07bpkvGXth1ZQQ6x61b2!1813238290?UID=852645997&parentUID=&reloadFrame=true

DP to VGA adapter :

- Vendor: **RS** / Reference: 790-3634

Appendix B - List of Abbreviations

AC	Alternating Current
DC	Direct Current
COMe	Computer On Module Express
CPU	Central Processing Unit
DP	DisplayPort
ESD	Electrostatic Sensitive Device
GND	Ground
HMU	Health Management Unit
LAN	Local Area Network
LED	Light Emitting Diode
OS	Operating System
PCI	Peripheral Component Interconnect
S3	Suspend to RAM
S4	Suspend to Disk
S5	Soft Power-Off
SATA	Serial Advanced Technology Attachment
SIM	Subscriber Identity Module
USB	Universal Serial Bus
WEEE	Waste Electrical and Electronics Equipment

MAILING ADDRESS
Kontron Modular Computers S.A.S.
150 rue Marcelin Berthelot - BP 244
ZI TOULON EST
83078 TOULON CEDEX - France

TELEPHONE AND E-MAIL
+33 (0) 4 98 16 34 00
Sales: Order-ATD-Toulon@Kontron.com
Support: GSS-ATD-Toulon@Kontron.com

For further information about other Kontron products, please visit our Internet web site: www.kontron.com.