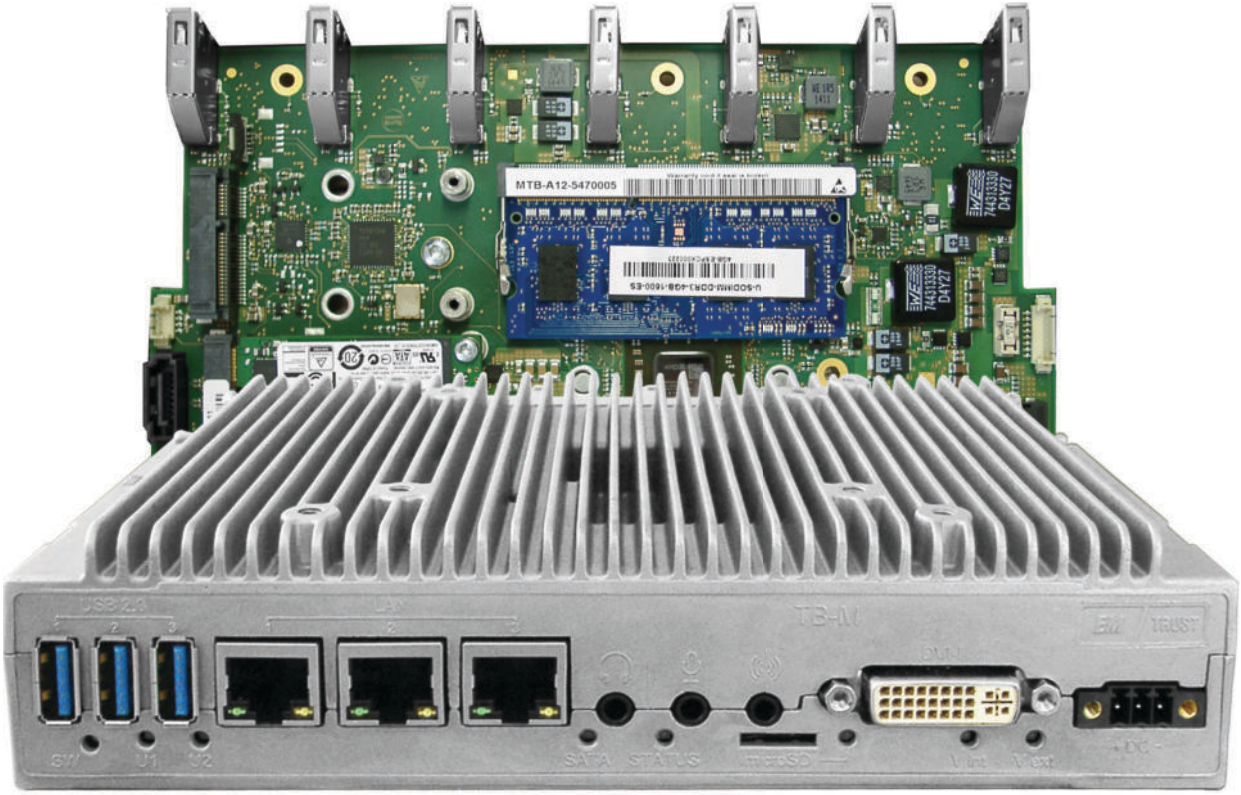

Manufacturer

E.E.P.D Electronic Equipment
Produktion & Distribution GmbH
Gewerbering 3
85258 Weichs - Germany
Phone +49 8136 2282-0
Fax +49 8136 2282-109
Internet: www.eepd.de
E-Mail: sales@eepd.de

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Disclaimer

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Life Support Applications

E.E.P.D.'s products are not intended for being used as critical components in life support appliances, devices or systems in which the failing of an E.E.P.D. product could be expected to result in personal injury.

Reshipment / Return

Please remove alle connections and peripheral devices when returning the TB-M system to the manufacturer. Use an appropriate packaging to protect the system during transport.

Packaging

In order to avoid damage in transit the TB-M has been shipped with an protective packaging. The packaging is made of recyclable materials which should be recycled.

Proper disposal

At the end of its life, dispose the device properly.

Table of contents

Required tools

M4 screws for hat-rail-mount (optional) mounting, 75x75 or 100x100 mm VESA mount (optional). The maximum thread depth of the housing is approx. 7mm.

For a secure mounting of the E.E.P.D. USB modules there is an optional module holder available.

We recommend following tools:

1 - Hat-rail-mount: TX20 Torx screwdriver

2 - VESA mount: Depending on screws supplied with VESA mount

4 - Module holder: TX10 Torx screwdriver

Further required tools depend on mounting type and place.

External documents

Please obey also external mounting and user manuals i.e. for the VESA mount.

Software

The TB-M supported OS are Windows® 7, 10, 10 IoT and Ubuntu 16.04 LTS.

Technical support

For technical information about hardware or software please contact „sales@eepd.de“.

Symbols

The yellow caution sign warns you when your safety or the safety of others is jeopardized.

It also warns you when a wrong or missing action could damage the TB-M System.

The blue sign provides information for the optimum usage of the TB-M Systems.

Installation and connection provisions

Please obey all safety instrucions at the place of installation.

Please ensure that during installation the TB-M is not powered.

Please ensure that during mechanical installation no cables are connected to the TB-M.

System characteristics - usage

The TB-M is a robust and modular PC system for harsh environments. An extended temperature version is optional available.

The aluminum housing protects against mechnical shocks and is optimal for heat dissipation.

The TB-M is free of rotating parts and therefore nonsensitive to shock and vibration.

The system is expandable by various USB-Modules that enable a wide range of interfaces and applications.

The range of applications is almost unlimited. The TB-M is well prepared for future expansions and developments by the standard USB-Bus-expansions.

Scope of supply

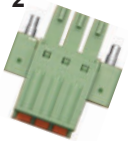
Please check before installation that all required parts are complete!

1 - TB-M System
2 - 3-pole Mini-Combicon connector
3 - User-Manual
4 - Driver CD
5 - Hat-Rail-Mount: Part.No. 20013 (optional)
6 - E.E.P.D. USB-Module-Mount: Part.No. KITB-MMH1 (optional)

4

3

2



5

1

6

Hat-Rail-Mount (optional)

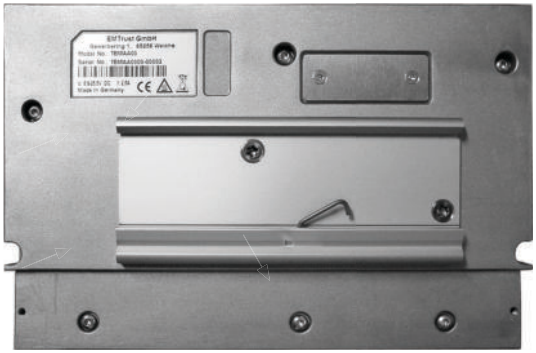
Fix the hat-rail-mount with the two Torx countersunk screws M4x8 to the TB-M. The supplied plastic washers are not used.

Mounting the TB-M to the hat-rail:

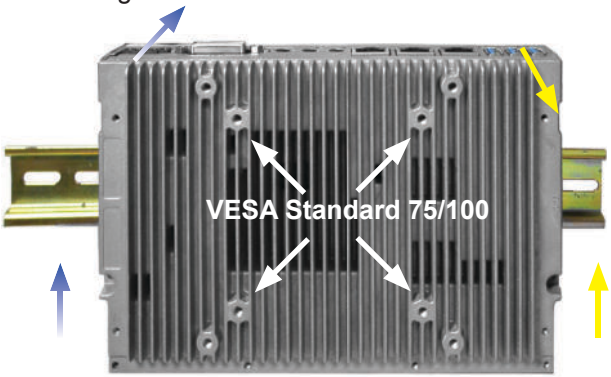
- First attach the hat-rail-mount to the lower side of the hat-rail. Now push the TB-M upwards and snap it into the upper part of the hat-rail.

Unmounting the TB-M from the hat-rail:

- Push the TB-M upwards and remove the upper part from the hat-rail.



Mounting Unmounting



VESA-Mount

The TB-M is prepared for a standard 75/100 VESA mount. We suggest four M4x6 screws for a 1mm thick VESA mount which results in a useable 5mm thread. The screws are not supplied with the system. For further information consult the VESA-Mount manual.

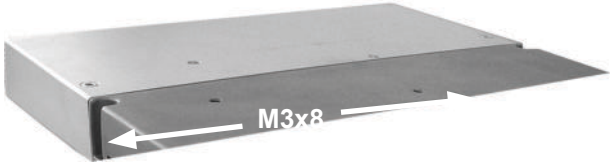
USB-module-holder mounting (optional)

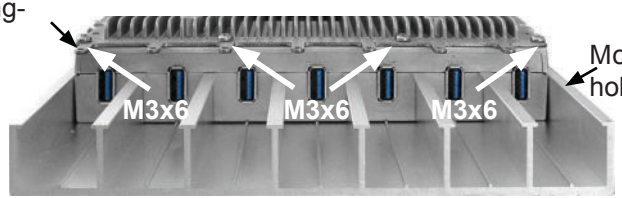
Parts contained in the kit Part. No. KITBMMH1

- 1x Module-holder
- 1x Fixing-strip
- 2x Screws M3x8, 4x screws M3x6

Screw the module holder to the TB-M system with two countersunk M3x8 screws.

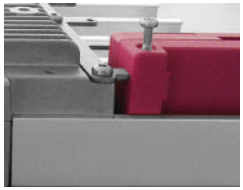
Screw the fixing-strip to the TB-M system with four M3x6 screws.





Mounting of USB-modules (optional)

To mount an E.E.P.D. USB-Module slide it along the guiding ridge and plug it into the USB connector. With the supplied screw it is interlocked with the fixing-strip.



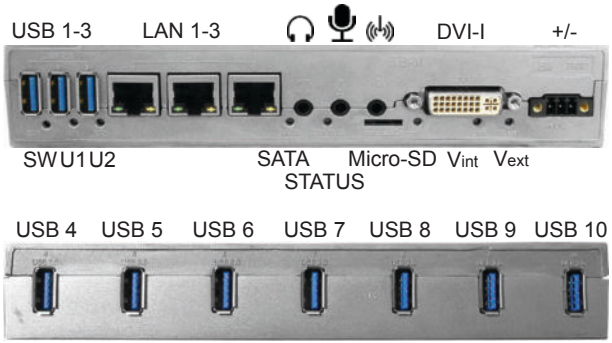
Power connection

The TB-M is powered through the supplied 3-pole Mini-Combicon connector.

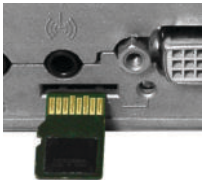
- Connect the positive terminal and the negative terminal as shown in the picture on the right. Dismantle the wire (1,5 mm² recommended) for about 6 mm. Now press the orange release and insert the wire into the connector.

Interfaces

USB 1-3	USB 2.0/Type A/Host Port
LAN 1-2	RJ-45/1-GBit/s Ethernet
LAN 3	RJ-45/1-GBit/s Ethernet (TB-M-F only)
🎧	Headphones
🎤	Microphone
(((•)))	Line Out
DVI-I	Display connector (DVI and VGA)
+/-	Power connector
Micro-SD	Micro-SD-Card slot
SW	Power button to turn system on/off
LED U1/U2	User-LED, universal assignment
LED SATA	HDD/SSD/SATA-LED
LED STATUS	Beeper-LED, in sync with beeper sound
LED Micro-SD	Micro-SD-LED, signals SD-card access
LED Vint	System-LED, signals power on
LED Vext	Power-LED, signals correct power supply
USB 4-9	USB 3.0/Type A/Host Port (TB-M-F only)
USB 10	USB 2.0/Type A/Host Port (TB-M-F only)
SIM	Mini-SIM-Card slot (optional)
SMA	WLAN/UMTS (optional)
FAKRA	WLAN/UMTS (optional)



Micro-SD-Card insertion

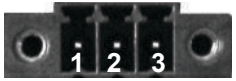


Insert the Micro-SD-Card as shown on the right picture. To interlock push the card completey to the system until your hear a click sound. To remove the card, reverse the procedure.

SIM-Card insertion (optional)

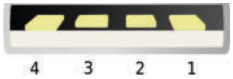
Insert the SIM-Card as shown on the right picture. To interlock push the card completey to the system. To remove the card press the release lever to the right.

Power supply connector



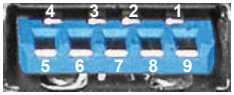
Pin	Signal	Description
1	+ (Vin)	DC+ (min 8 V to max 32 V)
2	NC	NC

USB 2.0 connector 1 - 3 and 10



Pin	Signal	Description
1	VBUS	USB_VCC (+5 V supply, current limited to 900 mA)
2	USB2DN_DN (D-)	USB 2.0 Data (Differential pair)
3	USB2DP_DN (D+)	
4	GND	Ground for power return
	Shield	Connector Shell

USB 3.0 connector 4 - 9



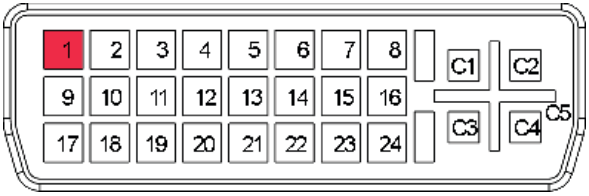
Pin	Signal	Description
1	VBUS	USB_VCC (+5 V supply, current limited to 900 mA)
2	USB2DN_DN (D-)	USB 2.0 Data (Differential pair)
3	USB2DP_DN (D+)	
4	GND	Ground for power return
5	USB3DN_RXDN (SSRX-)	Super Speed Receiver (Differential pair)
6	USB3DP_RXDN (SSRX+)	
7	GND	Ground for signal return
8	USB3DN_TXDN (SSTX-)	Super Speed Transmitter (Differential pair)
9	USB3DP_TXDN (SSTX+)	
	Shield	Connector Shell

DVI-I connector

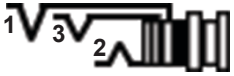
Pin	Signal	Description
1	TX2-	TMDS Data 2-
2	TX2+	TMDS Data 2+
3	GND	TMDS Data 2/4 Shield
4	N.C.	TMDS Data 4-
5	N.C.	TMDS Data 4+
6	DDC-CLK	DDC Clock
7	DDC-DATA	DDC Data
8	VSYNC	Analog Vertical Sync
9	TX1-	TMDS Data 1-
10	TX1+	TMDS Data 1+
11	GND	TMDS Data 1/3 Shield
12	N.C.	TMDS Data 3-
13	N.C.	TMDS Data 3+
14	VCC_S	+5 V Power
15	GND	GND (+5,Analog V/H Sy)
16	HPD_5V	Hot Plug Detect
17	TX0-	TMDS Data 0-
18	TX0+	TMDS Data 0+
19	GND	TMDS Data 0/5 Shield
20	N.C.	TMDS Data 5-
21	N.C.	TMDS Data 5+

DVI-I connector

Pin	Signal	Description
22	GND	TMDS Clock Shield
23	TXC+_CON	TMDS Clock+
24	TXC-_CON	TMDS Clock-
C1	DAC_RED	Analog Red Video
C2	DAC_GREEN	Analog Green Video
C3	DAC_BLUE	Analog Blue Video
C4	HSYNC	Analog H Sync
C5	GND	Analog GND (R, R&G)



Headphone jack



Pin	Signal	Description
1	HP_L_CONN	Left channel
2	GND_Audio	Ground
3	HP_R_CONN	Right channel

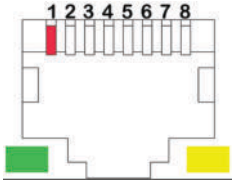
Microphone jack

Pin	Signal	Description
1	HP_L_CONN	Left channel
2	GND_Audio	Ground
3	HP_R_CONN	Right channel

Line Out jack

Pin	Signal	Description
1	HP_L_CONN	Left channel
2	GND_Audio	Ground
3	HP_R_CONN	Right channel

1-GBit/s Ethernet RJ-45/ 1-3



Pin	Signal	Description
1	MDI0P	D1+ (GBit Eth./drilled with D1-)
2	MDI0N	D1- (GBit Eth./drilled with D1+)
3	MDI1P	D2+ (GBit Eth./drilled with D2-)
4	MDI2P	D3+ (GBit Eth./drilled with D3-)
5	MDI2N	D3- (GBit Eth./drilled with D3+)
6	MDI1N	D2- (GBit Eth./drilled with D2+)
7	MDI3P	D4+ (GBit Eth./drilled with D4-)
8	MDI3N	D4- (GBit Eth./drilled with D4+)
	Shield	Connector Shell

Commissioning

If connectors cannot be reached after installation, connect all cables before final mounting. Also install Micro-SD-Card and SIM-Card in advance if necessary.

Connect power cable only when power is switched off.

Optional SIM-Card-Reader: Please insert or remove SIM-Card only when system is switched off.

Before startup we recommend to connect or insert:

- DVI- or VGA-Monitor to DVI-I-Connector
- USB Keyboard and Mouse
- Micro-SD-Card and SIM-Card (optional)
- DC Power Supply

Other Plug and Play interfaces can be connected after startup.

Powering ON / Operation

After all preparations have been made the system can be connected to the power supply. Depending on BIOS settings the system will automatically start up after power is enabled or the power button has to be pressed in order to turn on the system.

When power is applied to the system the Vext LED will turn on. When the systems starts up the Vint LED will turn on to show that all internall voltages are operating normal.

Now the system should start up the OS (when installed) and the SATA LED will show access to the internal SSD.

The further boot sequence depends on the OS and is documented with the OS.

An OS can be installed with any standard installation media like USB-Stick, USB-DVD-Drive or remote Network boot.

BIOS boot order has to be adjusted accordingly.

To enter the BIOS-Setup press the „del“ key periodically right after power on.

For power-off / shutdown please consult the OS manual.

When you press the power button the OS should normally shut down. If this fails you can press the power button at least for 5 seconds. This will cause a hard shutdown of the system. A hard shutdown can lead to loss of data or corruption of your SSD/HDD.

After shutdown of the system only the Vext LED will stay on. Now the system can be started again by pressing the power button.

Interfaces / Scope of Operation

The TB-M has various integrated interfaces for external devices to expand the funcionalities and LEDs for status informations:

- LEDs for monitoring of components, two are user configurable
- RJ-45 for GBit networks
- USB 3.0/2.0 interfaces
- Headphones, microphones
- Line Out
- DVI-I for DVI- or VGA-Monitor.
- Micro-SD-Card-Slot for mass storage
- Power button with hard shutdown capability
- Wide DC input range
- MSATA Flash SDD mass storage

E.E.P.D. offers optional USB expansion modules to further expand the functionality and various mounting options:

- Hat-rail mounting kit (Part.No. 20013)
- TB-H USB-Hub (Part.No. TBHAA0), expands the system by 7 more USB ports.
- USB-module-holder (Part.No. KITBMMH1), mechanical mounting and securing of USB modules.
- M232 - RS-232 USB-module with 9-pole D-Sub connector.
- M485 - RS-485 (half-duplex) USB-module with 9-pole D-Sub connector.

- M485 - RS-485 (full- duplex) USB-module with 9-pole D-Sub connector.
- MCAN - CAN USB-module with 9-pole D-Sub connector. Optional with galvanic isolation.
- METH - Ethernet USB-module with RJ-45 connector for 10/100/1000 MBit/sec Data-rate.
- MMC - Mini-Card-Carrier USB-module with SIM-Card-Socket for USB based Mini-PCIe cards.
- MGPI - GPIO USB-module with 8 inputs and 8 outputs. 26-pole 2 mm MicroClasp™ connector for up to 30 V and 1 A per I/O.
- MUMT - LTE USB-module for mobile 4G broad band networks with SIM-Card-Socket and two aerial sockets.
- MREL - Relais USB-module to switch and supervise up to four independent loads.
- MADC - ADC USB-module to convert A/D and DAC signals.
- Further USB-modules on request

By installing further optional internal components more functions are available. These options must be factory installed during system assembly:

- Internal LTE modem with two aerial sockets, SMA or FAKRA. Internal SIM-Card-Sock

OR

- Internal WLAN/Bluetooth adaptor with two aerial sockets.

Note:

Only one option can be installed at a time.

Technical data

- Processors depending on system version:
  Com.Temp.: Dual Core GE210HICJ23HM (optional)
  Quad Core GE415GIBJ44HM
  Ind. Temp.: Dual Core GE209HISJ23HM
- Memory: DDR3L/Maximal 8 GB
- Ethernet: 3x GBit Ethernet/RJ-45 (L-Version only 2)
- USB Host Port: 6x USB 3.0 (A), 4x USB 2.0 (A) (L-Version only 3 x USB 2.0)
- Flash-Drive: MSATA
- Display connector: DVI-I
  DVI resolution 1920x1200 @ 60 Hz
  VGA resolution 2048x1536 @ 60 Hz
- Audio connectors: 3.5“ stereo jack (1x Microphone /1x Headphones/1x Line Out)
- Micro-SD: 1 slot for Micro-SD-Card
- SIM: 1 slot for Mini-SIM-Card (optional)
- SW: Push button for system ON/OFF
- Control-LEDs: U1, U2, SATA, Status, Micro-SD, Vint, Vext
- OS support: Windows® 7, 10, 10 IoT, Linux Ubuntu 16.04 LTS
- Antenna connectors: SMA/FAKRA (optional)
- Power supply: DC 8 V (min) - 32 V (max)
  3-pin Phoenix Contact MC1,5/3GF
- Housing: Aluminum pressure die casting
- System expansion: Modular USB-holder for up to seven E.E.P.D. USB modules (optional)
- Mounting options:
  Prepared for VESA mounting
  Hat-Rail (optional)
  Others upon request
- Approvals: CE, ROHS, REACH
- Operating temperature:
  Commercial Temp.: 0 °C bis +60 °C (standard)
  Industrial Temp.: -40 °C bis +85 °C (optional)
- Storage temperature: -40 °C bis +85 °C (all versions)
- Maximum relative humidity:
  95 % @ 40 °C non condensing
- Dimensions: Approx. 194 x 127,3 x 41,7 (mm)
- Weight: Approx. 900 g / without options

Terminologie

COM	Serial Communication Port
CPU	Central Processing Unit
DC	Direct Current
DDR3	Third generation „Double Data Rate“ SDRAM memory technology
DVI-I	Digital Visual Inteface - Digital and analog display interface
EMI	Electromagnetic Interference
FAKRA	Automotive circle of experts - coded connector system according to ISO20860-1
Flash Memory	Digital non volatile memory device.
Gigabit Ethernet	Ethernet-connection with transfer speeds of up to 1000 MBit/s.
GND	Negative reference potential for signals and power
GPIO	General purpose input or output
HDMI	High Definition Multimedia Interface
Host	Synonymous with a processor system
LAN	Local Area Network - Computing-Network
LED	Light Emitting Diode
Line Out	Analogue sound ouput with low power
Micro-SD	Memory card format 11x15x0,7mm
MSATA	Mini Serial-ATA - Harddisk interface
PCI-E	Peripheral Component Interconnect Express - Serial point to point connection between CPU and peripherals
SATA	Serial-ATA - Serial point to point connection between CPU and HDD/DVD/SSD
SMA	Subminiatur A - Coax HF connector
SIM	Subscriber Identity Module
UMTS	Universal Mobile Telecommunications System
USB	Universal Serial Bus
WLAN	Wireless LAN

for your notes


E.E.P.D.
...just embedded!