

# TEBA0714 TRM

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## Overview

The Trenz Electronic TEBA0714 is a carrier for Trenz Electronic module TE0714 which is an industrial grade module integrated with Xilinx Artix 7.

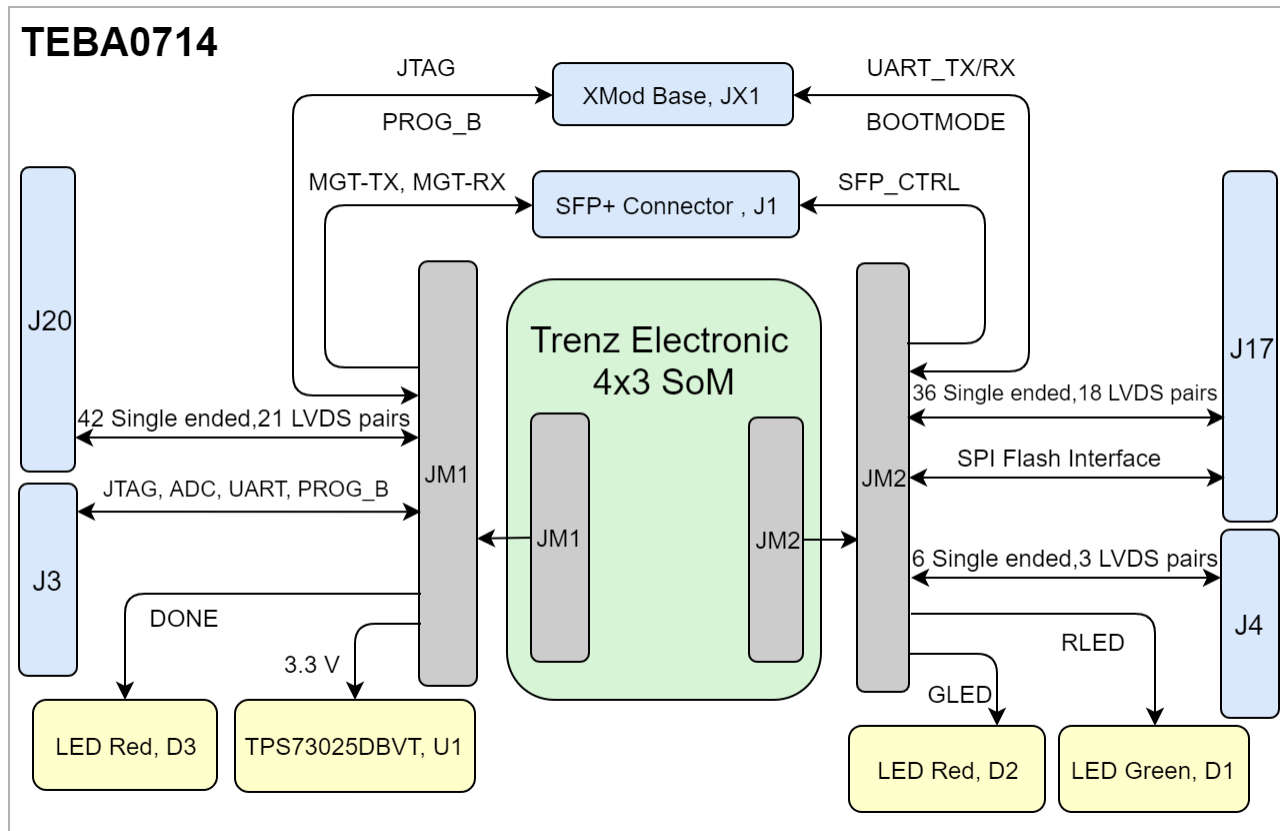
Refer to <http://trenz.org/teba0714-info> for the current online version of this manual and other available documentation.

## Key Features

- **Module:**
  - TE0714

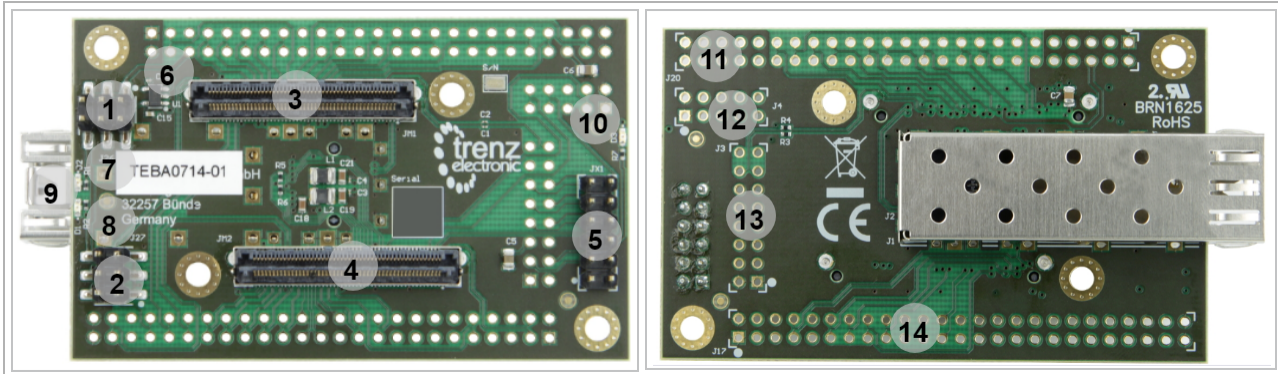
- **On Board:**
  - 2 x User LEDs (Red, Green)
  - 1 x DONE LED (Red)
- **Interface:**
  - 2 x Pin Header 50 Pol. (FPGA Bank I/Os and Power)
  - 2x Samtec 100 Pin LSHM Series Connectors
  - 1 x XMOD JTAG/UART Adapter (TE0790)
  - 1 x Pin Header 16 Pol. (JTAG, MGT-CLK, Boot Mode, XADC, I/O's)
  - 1 x Pin Header 10 Pol. (FPGA Bank I/Os and Power)
  - 1 x SFP+ Connectors
- **Power:**
  - 1 x LDO Regulator
  - 3.3V Nominal Power supply
- **Dimension:**
  - 46 mm × 75 mm

## Block Diagram



TEBA0714 block diagram

## Main Components



TEBA0714 main components

1. SMT pin header, J26
2. SMT pin header, J27
3. Board to Board (B2B) Connector, JM1
4. Board to Board (B2B) Connector, JM2
5. XMOD header, JX1
6. Voltage Regulator, U1
7. User Red LED, D2
8. User Green LED, D1 (Red)
9. SFP+ Connector, J1
10. User Red LED, D3
11. 50 pin header (Not assembled), J20
12. 16 pin header (Not assembled), J3
13. 10-pin header (Not assembled), J4
14. 50-pin header (Not assembled), J17

## Initial Delivery State

| Storage device name | Content | Notes |
|---------------------|---------|-------|
| ---                 | ---     | ---   |

Initial delivery state of programmable devices on the module

## Configuration Signals

| Signal   | MODE Signal State | Boot Mode       | Note |
|----------|-------------------|-----------------|------|
| BOOTMODE | 0                 | Slave SelectMAP |      |
|          | 1                 | Master SPI      |      |

Boot process.

| Signal | B2B    | Signal State | Note                                                      |
|--------|--------|--------------|-----------------------------------------------------------|
| PROG_B | JM1-94 | Active Low   | Clear FPGA configuration and initiate a new configuration |

Reset process.

# Signals, Interfaces and Pins

## Board to Board (B2B) I/Os

Number of I/O signals and Interfaces connected to the B2B connector:

| B2B Connector | Interface                      | Number of I/O                      | Notes        |
|---------------|--------------------------------|------------------------------------|--------------|
| JM1           | User I/O                       | 52 Single ended, 27 Differential   | -            |
|               | MGT lanes                      | 4 Differential, 2 lanes            |              |
|               | MGT reference clock input      | 2 Single ended, 1 Differential     |              |
|               | JTAG                           | 4 Single ended                     |              |
|               | SoM control signals            | 2 Single ended                     | PROG_B, DONE |
| JM2           | User I/O                       | 36 Single ended or 18 differential | -            |
|               | SFP+ Interface control signals | 8 Single ended                     |              |
|               | QSPI interface                 | 6 Single ended                     |              |
|               | UART interface                 | 2 Single ended                     |              |
|               | User LEDs                      | 2 Single ended                     | Red, Green   |
|               | SoM control signals            | 1 Single ended                     | BOOTMODE     |

General PL I/O to B2B connectors information

## On-board Pin Header

TEBA0714 is equipped with four pin headers J17, J20, J3 and J4 which are not assembled on the board, in case of need customer can solder the pins and have access to the signals in the following table.

| Pin Header | Interface           | Number of I/O                      | Notes               |
|------------|---------------------|------------------------------------|---------------------|
| J17        | User I/O            | 36 Single ended, 18 Differential   | Module FPGA Bank 14 |
|            | SPI interface       | 6 Single ended                     | -                   |
|            | Power               | 4 Single ended                     | 3.3V, V_CFG         |
| J20        | User I/O            | 42 Single ended or 21 differential | Module FPGA Bank 34 |
|            | Power               | 4 Single ended                     | 3.3V, V_CFG         |
|            | User LEDs           | 2 Single ended                     | Red, Green          |
|            | SoM control signals | 1 Single ended                     | 'BOOTMODE'          |
| J3         | JTAG                | 4 Single ended                     |                     |
|            | UART                | 2 Single ended                     | B14_L25, B14_L0     |
|            | ADC                 | 2 Single ended                     |                     |
|            | Clock               | 2 Single ended, 1 Differential     |                     |
|            | Power               | 4 Single ended                     | 3.3V, V_CFG         |
|            | Control Signals     | 2 Single ended                     | BOOTMODE, PROG_B    |
| J4         | User I/O            | 6 Single ended or 3 differential   |                     |
|            | Power               | 2 Single ended                     | 3.3V, 3.3V_OUT      |

General I/O to Pin headers information

JTAG Interface Base

JTAG access to the mounted SoM is provided through B2B connector JM1 and JM2 and is also routed to the XMOD JTAG/UART header JX1.

| XMOD Header Pin | Schematic | B2B Connector | Pin Header    | Note                  |
|-----------------|-----------|---------------|---------------|-----------------------|
| A               | B14_L25   | JM2-97        | J3-4          | UART Transfer         |
| B               | B14_L0    | JM2-99        | J3-7          | UART Receive          |
| E               | BOOTMODE  | JM2-100       | J3-9          |                       |
| G               | PROG_B    | JM1-94        | J3-11         |                       |
| C               | TCK       | JM1-90        | J3-4          |                       |
| D               | TDI       | JM1-86        | J3-10         |                       |
| F               | TDO       | JM1-88        | J3-8          |                       |
| H               | TMS       | JM1-92        | J3-12         |                       |
| 3.3V            | 3.3V      | JM1-97,99     | J3,J4,J17,J20 | Nominal Input Voltage |
| VIO             | V_CFG     | -             | J17-45        | Configuration Voltage |

JTAG pins connection

The DIP-switch S2 on XMOD Adapter TE0790 must be set as the following table.

| S2 | Status | Description                             | Notes                                |
|----|--------|-----------------------------------------|--------------------------------------|
| 1  | ON     | Update Mode JTAG access to SC CPLD only |                                      |
| 2  | OFF    | Must be in OFF state always             |                                      |
| 3  | OFF    | 3.3V is input                           | supplied from pin headers externally |
| 4  | OFF    | VIO is input                            | supplied from pin header externally  |

JTAG pins connection

SFP+ Connector

| Pin        | Connected to | Notes    |
|------------|--------------|----------|
| VCCR       | 3.3V         |          |
| VCCT       | 3.3V         |          |
| VREF       | GND          |          |
| TD+/TD-    | MGT TX       | MGT Lane |
| RD+/RD-    | MGT RX       | MGT Lane |
| TX/FAULT   | SFP0_TX_FAUL | SFP_CTRL |
| TX/DISABLE | SFP0_TX_DIS  | SFP_CTRL |
| MOD-DEF2   | SFP0_SDA     | SFP_CTRL |
| MOD-DEF1   | SFP0_SCL     | SFP_CTRL |

|          |              |          |
|----------|--------------|----------|
| MOD-DEF0 | SFP0_MT_DEF0 | SFP_CTRL |
| RS0/RS1  | SFP0_RS0_1   | SFP_CTRL |
| LOS      | SFP0_LOS     | SFP_CTRL |

#### SFP+ Connector Information

## SMT Pin Headers

There are two SMT Pin Headers, J26-J27.

J26 is available to choose voltage level for VCCIO34 (FPGA Bank 34) and J27 is provided to set the voltage level of V\_CFG (Configuration Voltage). In order to set the voltage level, you should connect it to the corresponding pin with the target value voltage.

| SMT Pin Header | VCCIO/VCC | Voltage Level | Notes    |
|----------------|-----------|---------------|----------|
| J26            | VCCIO34   | 1.8V          |          |
|                |           | 2.5V          |          |
|                |           | 3.3V          | 3.3V_OUT |
| J27            | V_CFG     | 1.8V          |          |
|                |           | 2.5V          | V_CFG0   |
|                |           | 3.3V          | 3.3V_OUT |

#### SMD Connector Information

## On-board Peripherals

| Chip/Interface       | Designator | Notes |
|----------------------|------------|-------|
| <a href="#">LEDs</a> | D1...3     |       |

#### On board peripherals

## LEDs

| Designator | Color | Connected to | Active Level | Note     |
|------------|-------|--------------|--------------|----------|
| D1         | Green | GLED         | Active High  |          |
| D2         | Red   | RLED         | Active High  |          |
| D3         | Red   | DONE         | Active Low   | DONE pin |

#### On-board LEDs

## Power and Power-On Sequence

### Power Supply

Power supply with minimum current capability of 3A for system startup is recommended.

The on-board voltages of the carrier board will be powered up with an external power-supply with nominal voltage of 3.3V.

## Power Consumption

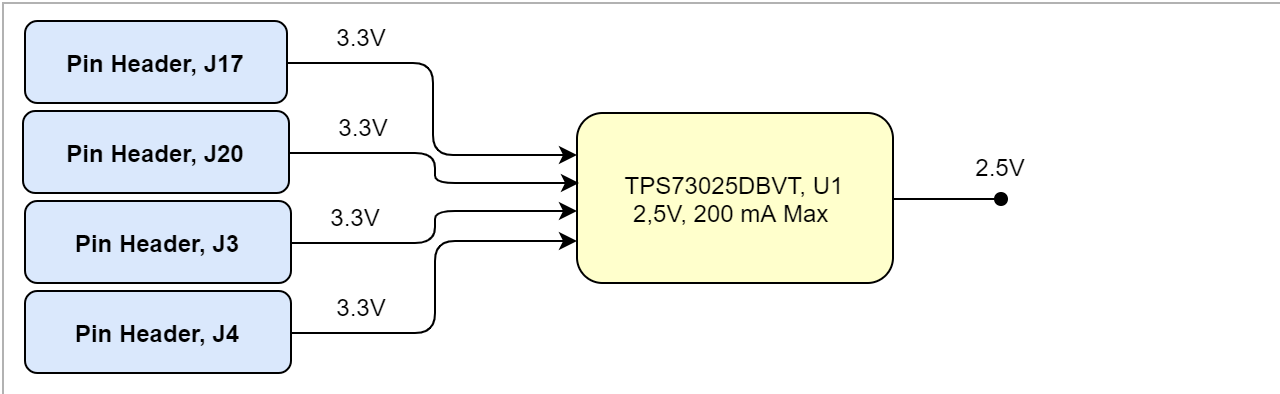
| Power Input Pin | Typical Current |
|-----------------|-----------------|
| 3.3V            | * TBD           |

### Power Consumption

\* TBD - To Be Determined

## Power Distribution Dependencies

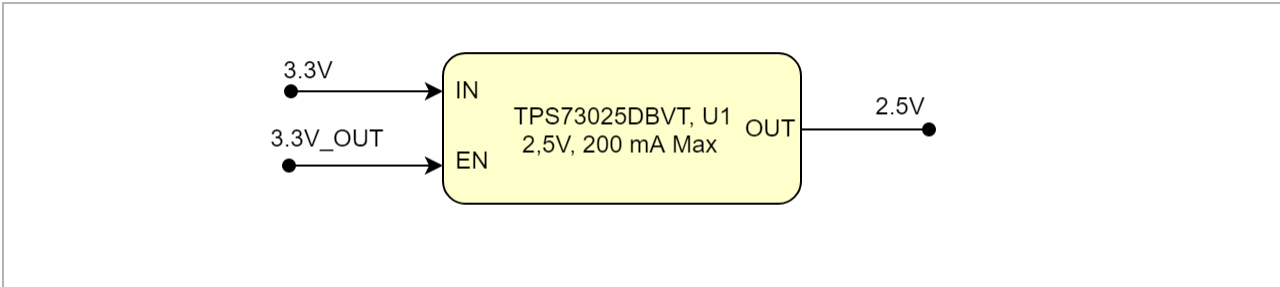
3.3V can be supplied through Pin Headers on specific pins.



Power Distribution

## Power-On Sequence

There is no specific power-on sequence. After power on, the module and carrier will be powered on.



Power Sequency

## Power Rails

| Power Rail Name | B2B , JM1 Pin | B2B JM2 Pin | Pin Header J17 | Pin Header J20 | Pin Header J3 | Pin Header J4 | Direction | Notes             |
|-----------------|---------------|-------------|----------------|----------------|---------------|---------------|-----------|-------------------|
| 3.3V            | 99,97         | -           | 5, 46          | 5, 46          | 5             | 5             | Input     |                   |
| 1.8V            | -             | 18          | -              | -              | -             | -             | Input     | Comes from Module |

|          |    |    |   |    |   |   |        |                        |
|----------|----|----|---|----|---|---|--------|------------------------|
| 3.3V_OUT | 83 | 54 | - | -  | - | 6 | Output |                        |
| VCCIO34  | 61 | -  | - | 45 | - | - | Output | Variable voltage level |
| V_CFG    | 53 | -  | - | -  | - | - | Input  | Variable voltage level |

**Module power rails.**

## Board to Board Connectors

TEBA0714 carrier use two [Samtec Razor Beam LSHM Connectors](#) on the bottom side.



These connectors are hermaphroditic. Odd pin numbers on the module are connected to even pin numbers on the baseboard and vice versa.

4 x 5 modules use two or three [Samtec Razor Beam LSHM connectors](#) on the bottom side.

- 2 x REF-189016-02 (compatible to LSHM-150-04.0-L-DV-A-S-K-TR), (100 pins, "50" per row)
- 1 x REF-189017-02 (compatible to LSHM-130-04.0-L-DV-A-S-K-TR), (60 pins, "30" per row) (depending on module)

### Connector Mating height

When using the same type on baseboard, the mating height is 8mm. Other mating heights are possible by using connectors with a different height

| Order number | Connector on baseboard      | compatible to               | Mating height |
|--------------|-----------------------------|-----------------------------|---------------|
| 23836        | REF-189016-01               | LSHM-150-02.5-L-DV-A-S-K-TR | 6.5 mm        |
|              | LSHM-150-03.0-L-DV-A-S-K-TR | LSHM-150-03.0-L-DV-A-S-K-TR | 7.0 mm        |
| 23838        | REF-189016-02               | LSHM-150-04.0-L-DV-A-S-K-TR | 8.0 mm        |
|              | LSHM-150-06.0-L-DV-A-S-K-TR | LSHM-150-06.0-L-DV-A-S-K-TR | 10.0mm        |
| 26125        | REF-189017-01               | LSHM-130-02.5-L-DV-A-S-K-TR | 6.5 mm        |
|              | LSHM-130-03.0-L-DV-A-S-K-TR | LSHM-130-03.0-L-DV-A-S-K-TR | 7.0 mm        |
| 24903        | REF-189017-02               | LSHM-130-04.0-L-DV-A-S-K-TR | 8.0 mm        |
|              | LSHM-130-06.0-L-DV-A-S-K-TR | LSHM-130-06.0-L-DV-A-S-K-TR | 10.0mm        |

**Connectors.**

The module can be manufactured using other connectors upon request.

### Connector Speed Ratings

The LSHM connector speed rating depends on the stacking height; please see the following table:

| Stacking height     | Speed rating       |
|---------------------|--------------------|
| 12 mm, Single-Ended | 7.5 GHz / 15 Gbps  |
| 12 mm, Differential | 6.5 GHz / 13 Gbps  |
| 5 mm, Single-Ended  | 11.5 GHz / 23 Gbps |
| 5 mm, Differential  | 7.0 GHz / 14 Gbps  |

**Speed rating.**

### Current Rating

Current rating of Samtec Razor Beam™ LSHM B2B connectors is 2.0A per pin (2 adjacent pins powered).

Connector Mechanical Ratings

- Shock: 100G, 6 ms Sine
- Vibration: 7.5G random, 2 hours per axis, 3 axes total

Manufacturer Documentation

| File                                                                                         | Modified                      |
|----------------------------------------------------------------------------------------------|-------------------------------|
| PDF File hsc-report_lshm-lshm-05mm_web.pdf High speed test report                            | 07 04, 2016 by Thorsten Trenz |
| PDF File lshm_dv.pdf LSHM catalog page                                                       | 07 04, 2016 by Thorsten Trenz |
| PDF File LSHM-1XX-XX.X-X-DV-A-X-X-TR-FOOTPRINT(1).pdf Recommended layout and stencil drawing | 07 04, 2016 by Thorsten Trenz |
| PDF File LSHM-1XX-XX.X-XX-DV-A-X-X-TR-MKT.pdf Technical drawing                              | 07 04, 2016 by Thorsten Trenz |
| PDF File REF-189016-01.pdf Technical Drawing                                                 | 07 04, 2016 by Thorsten Trenz |
| PDF File REF-189016-02.pdf Technical Drawing                                                 | 07 04, 2016 by Thorsten Trenz |
| PDF File REF-189017-01.pdf Technical Drawing                                                 | 07 04, 2016 by Thorsten Trenz |
| PDF File REF-189017-02.pdf Technical Drawing                                                 | 07 04, 2016 by Thorsten Trenz |
| PDF File TC0923--2523_report_Rev_2_qua.pdf Design qualification test report                  | 07 04, 2016 by Thorsten Trenz |
| PDF File tc0929--2611_qua(1).pdf Shock and vibration report                                  | 07 04, 2016 by Thorsten Trenz |

[Download All](#)

Technical Specifications

Absolute Maximum Ratings

| Symbols | Description          | Min  | Max | Unit |
|---------|----------------------|------|-----|------|
| VIN     | Input Supply Voltage | -0.3 | 6   | V    |
| T_STR   | Storage Temperature  | -40  | 125 | °C   |

PS absolute maximum ratings

Recommended Operating Conditions

Operating temperature range depends also on customer design and cooling solution. Please contact us for options.

| Parameter | Min   | Max   | Units | Reference Document        |
|-----------|-------|-------|-------|---------------------------|
| VIN       | 3.135 | 3.465 | V     | 3.3V Nominal Power Supply |

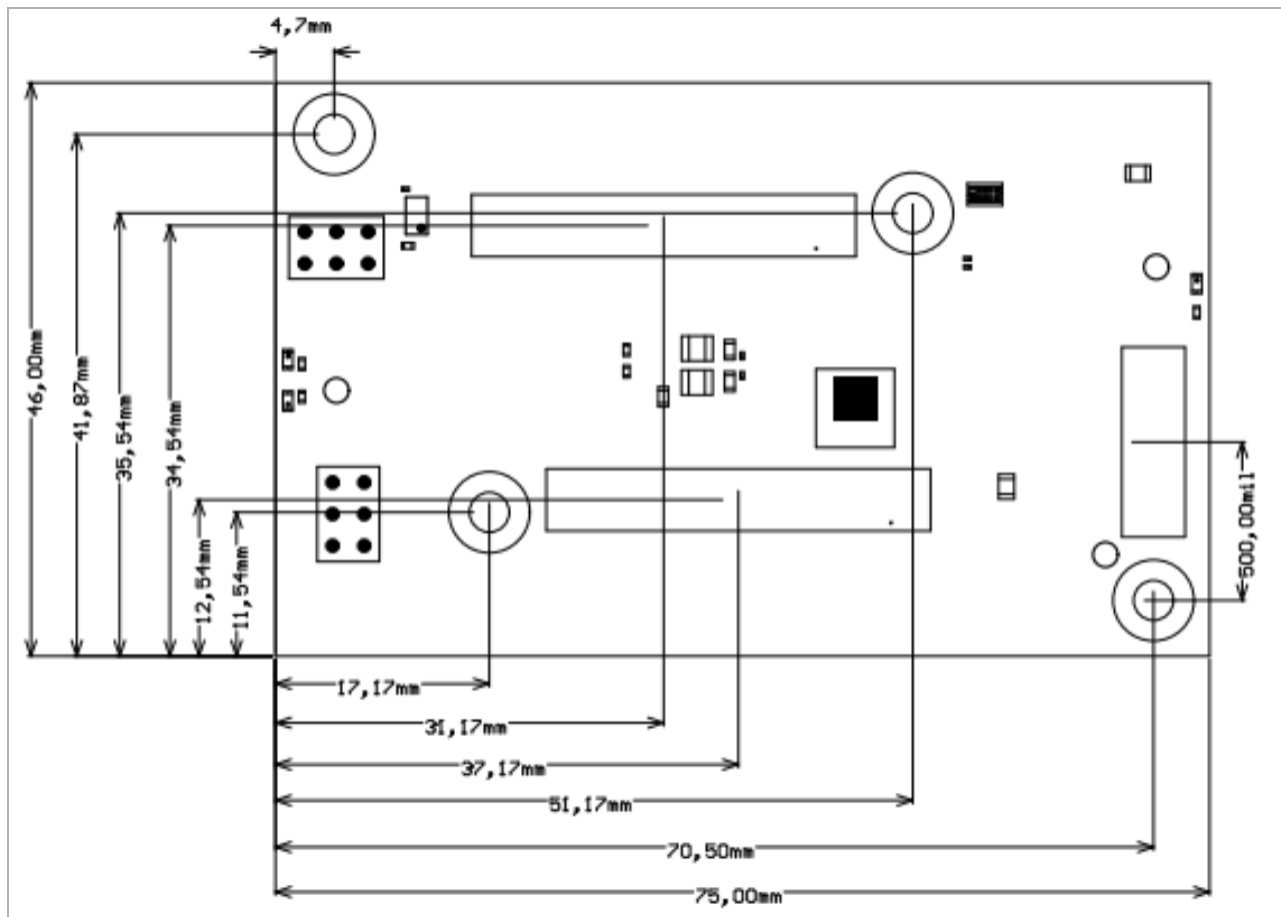
|       |     |    |    |  |
|-------|-----|----|----|--|
| T_OPR | -40 | 85 | °C |  |
|-------|-----|----|----|--|

Recommended operating conditions.

## Physical Dimensions

- Module size: 46 mm × 75 mm. Please download the assembly diagram for exact numbers.
- Mating height with standard connectors: 8 mm.

PCB thickness: 1.64 mm.



Physical Dimension

## Currently Offered Variants

|                                   |                             |
|-----------------------------------|-----------------------------|
| Trenz shop TEBA0714 overview page |                             |
| <a href="#">English page</a>      | <a href="#">German page</a> |

Trenz Electronic Shop Overview

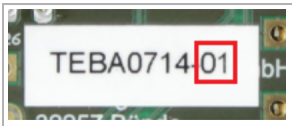
# Revision History

## Hardware Revision History

| Date       | Revision | Changes                                                         | Documentation Link    |
|------------|----------|-----------------------------------------------------------------|-----------------------|
| 2016-06-15 | 01       | <ul style="list-style-type: none"><li>Initial Release</li></ul> | <a href="#">REV01</a> |

### Hardware Revision History

Hardware revision number can be found on the PCB board together with the module model number separated by the dash.



Board hardware revision number.

## Document Change History

| Date | Revision | Contributor | Description |
|------|----------|-------------|-------------|
|------|----------|-------------|-------------|

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                 |
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| <p><b>Error rendering macro 'page-info'</b></p> <p>Ambiguous method overloading for method jdk.proxy279.\$Proxy4022#hasContentLevelPermission. Cannot resolve which method to invoke for [null, class java.lang.String, class com.atlassian.confluence.pages.Page] due to overlapping prototypes between: [interface com.atlassian.confluence.user.ConfluenceUser, class java.lang.String, class com.atlassian.confluence.core.ContentEntityObject] [interface com.atlassian.user.User, class java.lang.String, class com.atlassian.confluence.core.ContentEntityObject]</p> | <p><b>Error rendering macro 'page-info'</b></p> <p>Ambiguous method overloading for method jdk.proxy279.\$Proxy4022#hasContentLevelPermission. Cannot resolve which method to invoke for [null, class java.lang.String, class com.atlassian.confluence.pages.Page] due to overlapping prototypes between: [interface com.atlassian.confluence.user.ConfluenceUser, class java.lang.String, class com.atlassian.confluence.core.ContentEntityObject] [interface com.atlassian.user.User, class java.lang.String, class com.atlassian.confluence.core.ContentEntityObject]</p> | <p><b>Error rendering macro 'page-info'</b></p> <p>Ambiguous method overloading for method jdk.proxy279.\$Proxy4022#hasContentLevelPermission. Cannot resolve which method to invoke for [null, class java.lang.String, class com.atlassian.confluence.pages.Page] due to overlapping prototypes between: [interface com.atlassian.confluence.user.ConfluenceUser, class java.lang.String, class com.atlassian.confluence.core.ContentEntityObject] [interface com.atlassian.user.User, class java.lang.String, class com.atlassian.confluence.core.ContentEntityObject]</p> | <ul style="list-style-type: none"><li>Initial Release</li></ul> |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|

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|----|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|

Document change history.

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Data Privacy

Please also note our data protection declaration at <https://www.trenz-electronic.de/en/Data-protection-Privacy>

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To confront directly with the responsibility toward the environment, the global community and eventually also oneself. Such a resolution should be integral part not only of everybody's life. Also enterprises shall be conscious of their social responsibility and contribute to the preservation of our common living space. That is why Trenz Electronic invests in the protection of our Environment.

## REACH, RoHS and WEEE

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Trenz Electronic is a manufacturer and a distributor of electronic products. It is therefore a so called downstream user in the sense of [REACH](#). The products we supply to you are solely non-chemical products (goods). Moreover and under normal and reasonably foreseeable circumstances of application, the goods supplied to you shall not release any substance. For that, Trenz Electronic is obliged to neither register nor to provide safety data sheet. According to present knowledge and to best of our knowledge, no [SVHC \(Substances of Very High Concern\) on the Candidate List](#) are contained in our products. Furthermore, we will immediately and unsolicited inform our customers in compliance with REACH - Article 33 if any substance present in our goods (above a concentration of 0,1 % weight by weight) will be classified as SVHC by the [European Chemicals Agency \(ECHA\)](#).

### RoHS

Trenz Electronic GmbH herewith declares that all its products are developed, manufactured and distributed RoHS compliant.

### WEEE

Information for users within the European Union in accordance with Directive 2002/96/EC of the European Parliament and of the Council of 27 January 2003 on waste electrical and electronic equipment (WEEE).

Users of electrical and electronic equipment in private households are required not to dispose of waste electrical and electronic equipment as unsorted municipal waste and to collect such waste electrical and electronic equipment separately. By the 13 August 2005, Member States shall have ensured that systems are set up allowing final holders and distributors to return waste electrical and electronic equipment at least free of charge. Member States shall ensure the availability and accessibility of the necessary collection facilities. Separate collection is the precondition to ensure specific treatment and recycling of waste electrical and electronic equipment and is necessary to achieve the chosen level of protection of human health and the environment in the European Union. Consumers have to actively contribute to the success of such collection and the return of waste electrical and electronic equipment. Presence of hazardous substances in electrical and electronic equipment results in potential effects on the environment and human health. The symbol consisting of the crossed-out wheeled bin indicates separate collection for waste electrical and electronic equipment.

Trenz Electronic is registered under WEEE-Reg.-Nr. DE97922676.

Ambiguous method overloading for method `jdk.proxy279.$Proxy4022#hasContentLevelPermission`. Cannot resolve which method to invoke for `[null, class java.lang.String, class com.atlassian.confluence.pages.Page]` due to overlapping prototypes between: `[interface com.atlassian.confluence.user.ConfluenceUser, class java.lang.String, class com.atlassian.confluence.core.ContentEntityObject]` `[interface com.atlassian.user.User, class java.lang.String, class com.atlassian.confluence.core.ContentEntityObject]`